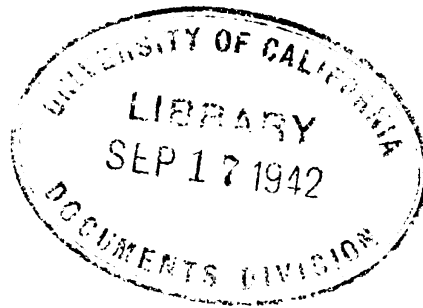
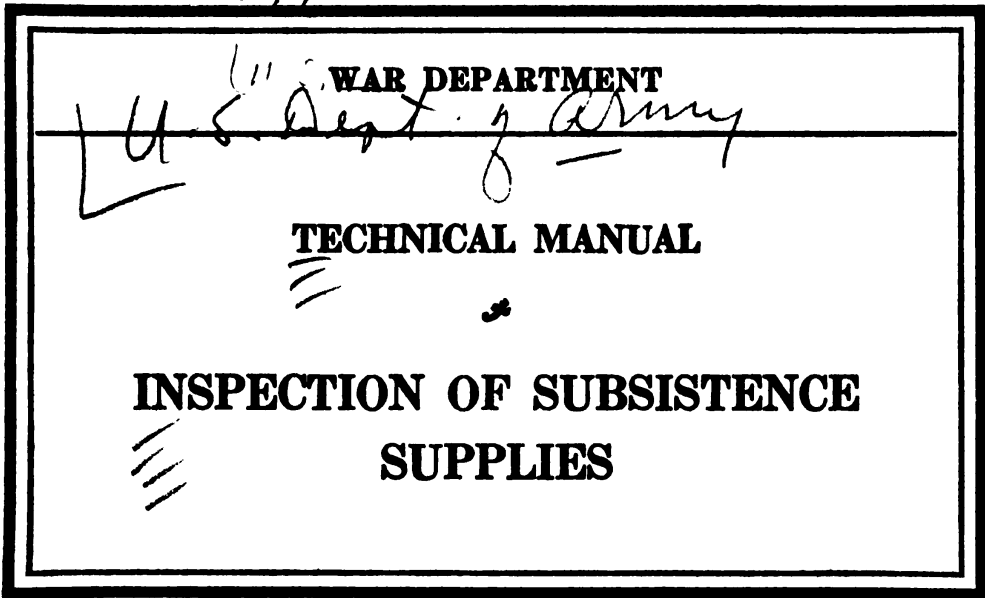


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TECHNICAL MANUAL }
 No. 10-210

WAR DEPARTMENT,
 WASHINGTON, September 23, 1940.

INSPECTION OF SUBSISTENCE SUPPLIES

Prepared under direction of
 The Quartermaster General

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SECTION I GENERAL

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1. Purpose.—The object of this manual is to provide information to subsistence inspectors at posts, camps, and stations where laboratory facilities are not available. Inspection procedure covered in detail in other manuals has been used only so far as is necessary to clarify procedures given in this manual. Because of rapid changes in production, handling, refrigeration, and marketing of subsistence commodities, procedure given herein should not be considered as unchangeable or inflexible. New and improved methods are being developed daily in the food field and inspection should be flexible enough to accommodate itself to those changes.

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2. Necessity for inspection.—Inspection is necessary to determine conformity of goods in question to specification requirements. When a specification has been officially established the inspector should not be influenced by price differentials in favor of articles below minimum requirements, but should insist upon conformity with the specification. Subsistence commodities vary greatly in food value because of variations in growth, preparation, sanitation, and methods of handling. Federal specifications establish a minimum of quality and condition for foods which are believed desirable or necessary to promote health and vigor. Inspection by competent personnel insures authorized quality as well as delivery of authorized quantities.

SECTION II

CANNED FRUITS AND VEGETABLES

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3. Trade terms.—*a. Blanching.*—Short preliminary cooking or parboiling given most vegetables and some fruits in an open kettle or “blancher” in order to soften the products, insure cleanliness, and remove any mucus coatings that may form upon surface of products handled.

b. Brineless pack.—A development using a minimum of brine or only brine naturally present in the product, and an exceptionally high vacuum (mechanical). Benefits obtained are more natural color and flavor.

c. Buckled.—Condition of cans with ends permanently distorted by too high an internal pressure during processing. Buckled cans generally show slight ridges in the ends near the seam. The ends will not pull back to their natural position and can only be forced back with difficulty. The high internal pressure developed may be due to overfilling, too short an exhaust, or when applied to No. 10 cans, improper cooling under pressure.

d. Can.—From the word “canister.” Refers to either a metal or glass container but primarily taken by the trade to refer to a metal container.

e. Canning.—Art of preserving food by placing it in hermetically sealed containers and obtaining complete or practically complete sterilization by application of heat.

f. Collapsed can.—A can which has caved in after sealing, processing, and cooling because of insufficient fill or as a result of leaks occurring in the seam, if such leaks are sufficient for some steam to pass out. Such leaks may close temporarily after or during processing so that the can has a very high vacuum when cooled. Collapsing may then occur.

g. Collar can.—Sanitary type of key-opening can with a narrow band of metal inserted in the top in such manner as to provide a rim for the cover to fit after the can has been opened by the consumer. Example, coffee can with key-opening device.

h. Crimping.—Process of fastening ends onto sanitary type cans by use of a machine called "double-seamer."

i. Double-seamer.—A machine which automatically places ends on sanitary cans and crimps them over a composition rubber or paper gasket without use of solder.

j. Exhausting.—Removal of air from filled containers for dual purpose of giving product sufficient room in the can in which to expand in processing, and to reduce possibility of spoilage which might result if aerobic bacteria were present. Air is removed by two methods:

(1) *Heat exhaust.* Filled cans are heated before closing and sealed while hot. In cooling, a partial vacuum is created in the can through contraction in volume of contents.

(2) *Mechanical exhaust.* Cans are closed under vacuum by actually drawing air from can and sealing before vacuum is released.

k. Flat sour.—A can not swollen whose contents have fermented without generating gas. External appearance does not indicate spoilage. Upon opening off-odor may be slight or entirely lacking. Taste may be more or less acid. It would be quite noticeable in a less acid product such as asparagus. Corn thus affected also has a tendency to become mushy. Flat sours are generally confined to starchy foods insufficiently processed or improperly cooled.

l. Flipper.—A can having little or no vacuum and with loose ends which may be pushed in, or when one end is struck against a flat surface or jarred, the other may be forced outward. The end forced outward usually may be pushed back in by hand without forcing the opposite end outward. Flippers generally are the result of insufficient exhausting. Contents may or may not be sound depending on whether on opening fermentation is observed or off-odors are detected. See springer.

m. Hole and cap can.—See vent filler. A hole cap soldered can differs from vent filler soldered can only in that a large opening is

provided in center of top for filling purposes. It is then necessary to cap the can opening with a separate piece of metal which must be soldered to the can after filling. There is a small hole in center of cap which must be soldered the same way as the hole in the vent filler type of can.

n. Incubating.—An expression applied to holding sealed cans suspected of having defects under special observation. Cans representative of lots in storage are placed in a warm room or chest where heat and storage conditions are regulated as desired. Bacteria if present in sufficient numbers as a result of insufficient processing will multiply rapidly and cause contents to become spoiled.

o. Enamel.—A varnish-like substance baked on one side of tin plate at high temperature and faced toward inside of cans to retard loss of product color (fruit enamel) or to prevent deposit of sulphide of iron (corn or C enamel). When applied to outside of cans to prevent rusting it is known as outside lacquer.

p. Leaker.—Any can which through mechanical adjustment or otherwise is not hermetically sealed and permits air to enter and product to exude. These leaks are further qualified by the section of can affected and are known as crimp, seam, end, body, etc.

q. Open bath.—Processing in open vats or kettles at boiling temperatures as opposed to processing at high temperatures under pressure.

r. Pack.—Product canned during a single season, for example, the 1940 apple pack.

s. Paneling.—Appearance of larger, properly handled cans, noticeable principally in No. 10 cans where sides are drawn in with fluted ridges running at right angles to the ends. This condition is the result of increased external over internal pressure. Some paneling is expected and a desired condition in most No. 10 cans.

t. Pinholding.—Result of attack of acid of product on minute spots of exposed steel on interior of can which has been imperfectly coated with tin. Attack may also occur at ends where tin plate is broken in forming or stamping. Attack is greater in enameled containers than in plain ones. However, enamel prevents or retards fading and this kind of can must be used when it is necessary to prevent product losing color.

u. Processing.—Subjection of sealed cans of product to heat for purpose of destroying harmful bacteria or causing it to change to spore form.

v. Sanitary can.—Modern type of almost solderless metal container having ends crimped into place by double-seamers and containing solder only on body seam.

w. Short vacuum can.—Springer resulting from insufficient exhaust.

x. Spangling.—Staining of tin plate on inside of can either as sulphide of tin deposit or as etching action found on inner surface. It usually results in the can having a mottled or streaked appearance. It could be prevented by the use of C enamel lining. This condition is not objectionable or deleterious to contents.

y. Springer.—A filled can whose ends are bulged as a result of overfilling, insufficient exhausting, or evolution of hydrogen or carbon dioxide gas through bacterial action, or action of acid contents on metal of can. When one end is pressed in with the hands or fingers, the opposite end bulges out. In this respect it differs from a flipper in which the loose tin may be pressed in without bulging out the opposite end. Products in such cans are not safe for human consumption and should be rejected.

z. Swell.—A bulged-out, filled can with both ends remaining taut as distinguished from a flipper or springer. All swells were previously springers. Springers, swells, and flippers are caused by much the same condition, fermentation and decomposition by micro-organisms; or chemical action accompanied by evolution of gas (hydrogen swell), the release of vacuum, and a consequent swelling or bulging. This condition may also be caused by leaky cans which permit entrance of micro-organisms. Products in such cans are not safe for human consumption and should be rejected.

aa. Vent filler can.—The vent filler soldered type can is one which has both ends soldered to the body by the manufacturer and has a small hole in the center of one end through which a liquid product is introduced. After filling the opening is closed with solder. Used for canning evaporated milk.

4. Vegetables.—*a. Grades.*—(1) *Quality.*—Commercially canned vegetables are generally graded for quality as follows:

(a) *Fancy.*—Usually as nearly perfect as nature and the art of canning permit. Products of this grade should be tender, succulent, of fine form, free from blemishes and extraneous matter, and have a clear liquor.

(b) *Extra standard.*—This grade is nearly as good as Fancy. It may be the second grade packed, a lot that was packed for fancy and because of some defect could not so grade, or it may be the best the particular season produces. It may have two or three but not all of the following defects:

1. Lack of form symmetry.
2. Lack of color uniformity.
3. Lack of the color depth found in Fancy.

4. Slight blemishes or spots.
5. Larger pieces than Fancy.
6. Not so tender or succulent as Fancy.
7. Not quite so well-trimmed as Fancy.
8. Not quite so fine-flavored as Fancy.

(c) *Standard*.—This grade is good edible food, wholesome in every respect, but includes vegetables not considered fit for Fancy or Extra Standard grades on account of—

1. Off-color.
2. Excessive defects such as spots, blemishes, hard portions, lack of size uniformity.
3. Lack of symmetry of pieces.
4. Not well-trimmed, cored, or peeled.

A prominent feature of standard grade is often lack of tenderness as in peas or corn, or somewhat broken product, fewer whole pieces as compared with higher grades, or lack of color uniformity as in tomatoes.

(d) *Substandard*.—This grade is ordinarily an “off-pack,” a result of an item packed for standard (or higher grade) having been found inferior in quality after canning. Accordingly, it represents a comparatively small proportion of commercial canned food. While the product must be wholesome and free from decomposed or putrid materials, it will usually be tough, flavorless, or off-flavor, unsightly and unattractive in appearance. It should not be difficult to detect this grade.

(2) *Standards*.—The Federal Government has no authority to establish grades for canned goods except under the provisions of law. In the commercial field grading is done by inspectors licensed by the Federal Government. For guidance of these inspectors the Department of Agriculture has established and published grades for a number of items which are published in pamphlets known as United States Standards and copies may be obtained from the Department of Agriculture.

b. *Inspection*.—(1) Particular attention is invited to section IV, Circular 1-4, Office of the Quartermaster General, with changes and references mentioned therein.

(2) It might be well to remember that acceptance or rejection of supplies on the part of an inspector may mean that he will be called upon to explain his action, therefore an inspector must use discretion and oftentimes diplomacy. Inspectors should in no case permit them-

selves to become weak in their responsibility but they should give reasonable consideration to the following factors:

Availability.

Suitability.

Cost.

Climatic conditions.

Human and mechanical elements involved.

(3) Inspection is made to determine whether or not supplies meet contract requirements for *quality*, *quantity*, and *condition*. In the majority of cases requirements are based upon Federal or Army specifications which are made a part of the contract. Before making inspection for requirements, the inspector should make sure that he fully understands the contract requirements and specifications pertaining thereto. Federal specifications have been promulgated for practically every item of subsistence necessary for the Army. It is believed that these specifications adequately describe the characteristics necessary to secure desired item.

(4) Inspectors should call upon contracting officers for specifications or detail requirements of items to be inspected.

(5) When it is necessary to purchase an item for which no specification has been issued, the inspector must then depend upon his own good judgment. One of the best known and practical methods is to compare the sample being inspected with a like item of known grade and quality.

(6) Particular attention is invited to excerpts from the Federal Food, Drug, and Cosmetic Act, effective June 25, 1938, in section XV.

5. Fruit.—According to Federal standards, canned fruit is—

The clean sound product made from properly prepared fresh fruit, with or without water and/or sugar:

(a) By processing in a suitable, hermetically sealed container, or

(b) By heating and packing in a suitable container which is then hermetically sealed.

a. Sugar—(1) *Form and kind.*—In most canned fruits, sugar is added in the form of sirup. There are many kinds of sugars varying in sweetness, color, texture, granulation, and physical properties. Sucrose is a disaccharide most commonly known commercially as cane or beet sugar. Chemically and in degree of sweetness there is no difference between beet and cane sugar. If they are properly manufactured one is as suitable as the other. The matter of purity of any sugar is for the chemist or bacteriologist to determine. Under Government regulations, if any sugar other than sucrose or corn sugar is used that

fact must be indicated on the label. Other sweetening agents such as dulcin and saccharine are considered as adulterants. The sirup density used varies directly with the grade of the pack, for example, fancy fruits have denser sirup than choice fruits of the same variety.

(2) *Density.*—(a) *Test.*—In practically all canned fruits, Federal specifications require that the fruit be packed in sirup testing not less than a given degree Brix at time of cut-out. This test is made with a Brix hydrometer which registers directly the percentage of sugar to water used, for example; sirup 10° Brix indicates that there is 10 percent sugar by weight in the solution, that is, 10 pounds of sugar to 90 pounds of water. To obtain the reading a sufficient amount of liquor is drained into a graduate of diameter somewhat wider than the hydrometer base. The hydrometer is allowed to sink into the sirup as far as it will of its own weight. When taking the reading, the hydrometer should not be in contact with sides of the graduate as tendency of the hydrometer to adhere to the sides would influence the depth to which it would sink and would show a higher density reading if in contact with the side of the graduate. The reading is taken at point of contact of the hydrometer scale with the sirup level. As hydrometers are scaled to float at a given height at a temperature of 62.5° F. or 17.5° C., necessary corrections for actual temperature must be made when accurate determinations are required. For practical work in testing canned goods this temperature variation may be disregarded as the correction amounts to less than 1 percent for temperatures ranging from 14° F. to about 90° F. for the heaviest sirups used. Variation below 14° F. and above 90° F. is greater and correction should be made by subtracting the correction from the reading for temperatures below 63.5° F. and adding it for temperatures above this figure.

(b) *Variation.*—Sirup never has the same density on cut-out as it does when added to fruit. This is a vexing problem to the canner. Federal specifications prescribe minimum cut-out densities for grades purchased and the canner who supplies the Government must meet these minimum requirements; however, an inspector should not consider sirup density of greater importance than character and quality of the fruit. Through careful test made in the western laboratories of the National Cannery Association, it was found that there were variations of as much as 2 percent in the cut-out density of the same lot of canned fruit with the same grade of fruit used, and with the same initial degree of sirup, all packed in the same day.

b. Requirements.—In addition to requirements for sirup density, particular attention should be paid to requirements for count (minimum and maximum number of pieces), drained weight, and net weight.

c. Grading.—(1) Canned fruits may be scored numerically in the same manner as canned vegetables.

(2) It is recommended that subsistence inspectors provide themselves with a set of United States Standards for canned fruits and vegetables. These Standards may be obtained from the Agricultural Marketing Service, United States Department of Agriculture, Washington, D. C.

6. Storage.—*a.* Keeping quality of canned food depends upon—

- (1) Nature of product.
- (2) Sanitary and quick handling (prevention of contamination).
- (3) Prior cure, for example, sauerkraut, corned beef, etc.
- (4) Added ingredients, sugar, salt, vinegar, spices, benzoate of soda, etc.

(5) Exhaust (removal of air, oxygen). This is never complete.

(6) Hermetical sealing, prevention of contamination.

(7) Processing, partial or complete sterilization.

b. Causes of spoilage.—Theoretically, canned food may keep forever. Practically, it could spoil or deteriorate to a great extent in from 1 day to 25 years. Such spoilage is caused by—

(1) Nature of product. Acid of certain fruits and vegetables reacts with metal of the can causing pinholes, etc. Many highly colored products (particularly red and black) fade. Some items disintegrate with time. Products containing sulphur and not packed in C enamel cans take on a black discoloration caused by interaction of tin or iron and sulphur, forming a black sulphide. This takes place shortly after processing.

(2) Improper handling.

(3) Incomplete exhaust. The oxygen present favors chemical action which increases fading, and also favors micro-organisms of most types, causing breaking down of fats, etc.

(4) Rusted and dented cans or those having nail holes punched in them in sealing the case.

(5) Improper sealing. Even a good seal may breathe a little air.

(6) Imperfect sterilization. Many thermophilic bacteria are not killed but continue to exist in spore form.

(7) Increased chemical action through warmth or heat. Action of acid is said to double in intensity for each 18° rise in temperature.

Spores of thermophilic bacteria develop causing flat sours at temperatures slightly above 100° F.

(8) Freezing. This causes product to disintegrate (cell walls are broken). May sometimes burst can seams, and may cause sweating with consequent rusting.

c. Preventive measures.—Considerable loss to the Government may be prevented by observing the following suggestions:

(1) Avoid storing in a damp place. Avoid sweating caused by sudden changes in temperature. Provide ventilation. These steps will prevent rusting.

(2) Avoid high temperatures. The ideal would be approximately 50° F. This can seldom be attained, but it is unnecessary to store near radiation or so high as to place canned food in warmer areas near the ceiling.

(3) Store cases on their sides on dunnage. If canned food is stored in this manner leakers will be detected more readily and should they develop, leakage will not collect in bare concave top surface of can and much rusting will be prevented. Further, can contents will have a better appearance on the cut-out as there will be no collection of off-color, etc., at the top.

(4) Avoid freezing temperatures (few items will freeze unless temperatures fall below 28° F. for several hours). However, frozen canned food is seldom ruined if cans do not burst or seams are not loosened. In defrosting do not warm suddenly. Rise in temperature should be slow. If cans are once frozen it is better to let them remain so until ready for use if there is danger of another freeze. Several short freezes affect food more than one long one.

(5) Use oldest lot first. There are exceptions to this rule. It might be that a newer lot is showing more signs of deterioration. In such event it should be used first. Constant and thorough inspection, together with a thorough knowledge of the stock, is the best safeguard.

(6) Keep places where spoiled canned food is held awaiting action of the contractor on reclamation or the survey officer clean and sanitary, otherwise such places become breeding sections for rodents, insects, and micro-organisms.

7. Can sizes.—There are several hundred sizes and many styles of cans on the market; however, the can capacity table shown below describes those most commonly used.

INSPECTION OF SUBSISTENCE SUPPLIES

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CAN CAPACITY TABLE

Container description	Name	Ounces avoirdupois capacity at 68° F.		Fluid ounces	Maximum allowable head space
		Per 1/8	Full can		
202 x 214	5Z	0. 121	4. 9	4. 7	12
202 x 308	6Z	. 121	6. 1	5. 8	14
208 x 211	Baby	. 162	6. 0	5. 8	12
211 x 300	8Z short	. 189	7. 9	7. 6	13
211 x 304	8Z tall	. 189	8. 7	8. 3	13
211 x 400	Picnic	. 189	10. 9	10. 5	16
211 x 414	No. 1 soup	. 189	13. 6	13. 1	19
211 x 600	Pint	. 189	17. 0	16. 3	22
300 x 407	No. 300	. 234	15. 2	14. 6	17
300 x 409	No. 300X	. 234	15. 7	15. 1	18
303 x 406	No. 303	. 264	16. 9	16. 2	17
303 x 509		. 264	21. 9	21. 0	21
303 x 512		. 264	22. 7	21. 8	22
307 x 302	No. 2 squat	. 307	13. 5	13. 0	13
307 x 306		. 307	14. 7	14. 1	14
307 x 400	No. 2 short	. 307	17. 8	17. 1	16
307 x 408	No. 2 special	. 307	20. 3	19. 4	18
307 x 409	No. 2	. 307	20. 6	19. 7	18
307 x 510	No. 2 tall (east)	. 307	25. 8	24. 8	21
307 x 512		. 307	26. 4	25. 3	22
307 x 604	No. 2½ round asparagus	. 307	28. 8	27. 7	23
401 x 411	No. 2½	. 432	29. 8	28. 6	18
404 x 414	No. 3	. 487	35. 1	33. 7	19
502 x 510	No. 5	. 703	59. 1	56. 7	21
603 x 408		1. 032	68. 1	65. 4	18
603 x 700	No. 10	1. 032	109. 4	105. 1	26
603 x 812	Full gallon	1. 032	138. 3	132. 9	31

Capacities shown are values without any head space; varying specific gravities of products preclude figures showing actual commercial weights obtained.

Capacity per 1/8-inch of height is same for all cans of same diameter. Figure may be used to calculate capacity of heights of cans not given.

As measured in 32ds from top of double seam. Head spaces greater than these will violate McNary-Mapes amendment; properly filled cans will show less head space.

SECTION III

FRESH FRUITS AND VEGETABLES

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Beans.....	20
Beets.....	21
Cabbage.....	22
Carrots.....	23
Cauliflower.....	24
Celery.....	25
Corn (Green).....	26
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8. Grades and purchase.—*a. Grades.*—Standard grades for fresh fruits and vegetables were developed by the United States Department of Agriculture and are known as United States grades. Minimum quality requirements are clearly defined in the various grades. Since all Federal United States Standards describe the minimum quality permitted in a grade, there is a possibility of difference in quality between vegetable lots of the same grade designation. Fruits and vegetables graded at point of origin may not grade the same when received at destination due to deterioration or injury in transit.

b. Purchase.—The following points should be considered in inspection of fresh fruits and vegetables:

(1) Large size fruits and vegetables are not always the best quality. As vegetables mature they have a tendency to become woody or to develop a hollow condition.

(2) Avoid commodities showing decay. Those showing slight decay will deteriorate rapidly.

(3) Distinguish between blemishes that affect appearance and those that affect eating quality. Cauliflower or cabbage may arrive with a few outer leaves yellowed. Such blemishes are removed in normal preparation for use. Amount of waste resulting from removal of blemishes in preparation for table use should be one of the determining factors in acceptance or rejection.

(4) Appearance and quality are closely associated but fine appearance does not always signify fine quality. Often fruit of attractive appearance may have poor quality because of a varietal characteristic or of some internal condition such as overmaturity.

(5) As fruits and vegetables are desirable for their flavor they should always be tasted before acceptance.

(6) See that containers hold full measure. Frequently containers are repacked, sometimes so loosely that they do not hold the required quantity.

9. Apples.—Apples for dessert should be of medium size and of good color and flavor. Tart or slightly acid fruit is best for general cooking purposes.

a. Containers and markings.—(1) *Boxes* are marked to indicate variety, numerical count, and grade. Western boxed apples are packed as Extra Fancy, Fancy, or C grade, or as a combination of any of these grades.

(2) *Barrels and baskets* are marked to indicate variety, diameter of smallest apples they contain, and grade. Grade is usually based on United States grades as prescribed by United States Standards.

b. Inspection.—(1) Apples of good quality should be firm, of good color and flavor. Immature apples lack color, flavor, and have a shriveled appearance after having been in storage.

(2) Overripe apples yield to slight pressure, flesh is often soft and mealy, and they lack flavor.

(3) Apples coming from storage should be examined for “scald.” This is a storage and transportation disease. It first appears as brown-tinted irregular areas on the surface, especially green areas. In severe cases, affected area is dark brown and may show decay. This defect often appears after removal from cold storage. Scald is less likely to

be found on fruit wrapped in oiled paper or packed with shredded oiled paper.

(4) Other inspection factors are internal break-down, freezing, insect and mechanical injury, bruises, and decay.

a. Storage.—(1) Temperature, 31° to 32° F.

(2) Relative humidity, 85 to 90 percent.

(3) Ventilation, at least two changes of air per day.

(4) Summer varieties are poor keepers and should not be stored. Fall varieties will keep from 1 to 4 months under good storage conditions, late fall and winter varieties from 4 to 6 months.

10. Avocado or alligator pear.—The avocado is marketed to a considerable extent under the trade names of Flavocado and Calavo. Avocados vary greatly in shape, size, color, and appearance. The skin may be paper thin and relatively smooth, or it may be thick and leathery. Thin-skinned varieties are more attractive but the thicker-skinned are just as desirable so far as quality and flavor are concerned.

a. Inspection.—(1) Avocados should be heavy, have a bright fresh appearance, and be fairly firm. Texture of flesh should be soft and buttery. Avocados not having buttery smoothness of flesh may have a flat, watery taste.

(2) Reject bruised fruit as it affects flesh quality.

(3) Scab is a light-brown, irregular marking on surface and does not affect flesh quality.

(4) Decay is detected by dark sunken spots.

(5) Avocados with broken or punctured skin should be rejected.

b. Storage.—Softening of avocados may be retarded by keeping fruit in a cool, dry place at a temperature not below 42° F. They should not be stored over 1 week.

11. Bananas.—*a. Inspection.*—(1) Ripeness stage:

(a) Full ripe—skin should have no trace of green and be flecked with brown.

(b) Hard ripe—skin is yellow with no trace of green and without flecks.

(c) Turning ripe—skin is yellow with green at tip.

(2) A good banana should be plump, well-filled, and firm. Poor condition is indicated by badly discolored skin and soft, mushy, or discolored flesh.

(3) Bruised fruit indicated by dark areas of skin is wasteful and should be rejected.

b. Storage.—(1) Temperature, 56° to 60° F.

(2) Relative humidity, 75 to 85 percent.

(3) Ventilation, free circulation of air around containers

(4) Bananas stored in too low a temperature will lose flavor and skins will develop a dark brown color.

12. Berries.—*a. Inspection.*—(1) Quality is indicated by a bright, clean, fresh appearance, full solid color, and plumpness of individual berry. Berries should be free from dirt, trash, moisture, and adhering caps. Over-ripe berries are dull in color, soft, and leaky. Leaky condition is best discovered by tilting container and examining it for stains. Often the soft and damaged berries are on the bottom. Mold on surface of berries indicates decay.

(2) Strawberries *without* caps may be overmature and break down rapidly.

b. Storage.—(1) Temperature, 30° F.

(2) Relative humidity, 80 to 85 percent.

(3) Ventilation, free circulation of air.

13. Cherries.—Cherries are classified as sweet and sour. Important sweet varieties are Royal Anne (light-fleshed), Bing, Lambert, and Windsor (dark-fleshed). Important sour varieties are Montmorency and Early June.

a. Inspection.—(1) Good quality cherries should have a bright, fresh appearance, be plump, fairly firm, well-colored for variety, and juicy.

(2) Immature cherries are usually smaller than the ripe fruit, hard, of poor color, and very acid. Overmature cherries are generally of dull appearance, soft, shriveled, and may be leaky.

(3) Close examination should be made for worm injury which is not always apparent on outside of fruit.

(4) Decay is indicated by small, brown, circular spots and by damp, stained, and leaky boxes.

(5) Cherries that have been bruised or otherwise mechanically injured should be rejected as molds will develop readily at point of injury.

b. Storage.—(1) Temperature, 31° to 32° F.

(2) Relative humidity, 80 to 85 percent.

(3) Ventilation, free circulation of air around containers.

(4) Under above conditions, good, sound fruit will keep about 1 week.

14. Grapes.—Grapes found in the market are of two distinct types, American, grown mainly in Eastern and Central States, and European, grown chiefly in California. Skin and pulp of the European type do not separate, but seeds separate readily from the pulp. The more important varieties are Flame Tokay, Malaga, Emperor, and Sultanina (Thompson seedless). Skin and pulp of the American type

separate easily. The most common varieties are Concord, Catawba, Moore, Worden, Niagara, and Delaware.

a. Inspection.—(1) Grapes of good quality should have fresh appearance, good color, and be plump. Individual berries should be firmly attached to stems. Usually the white or green grapes of both American and European types are at their best when turning to an amber color.

(2) Grapes injured by freezing have a flat flavor and should be rejected. European grapes injured by freezing have a dull, dead appearance, become sticky, the berries shatter readily and when pulled from the cap stem, the brush is somewhat discolored and shorter than normal. American type grapes injured by freezing are shriveled and show a milky pulp condition. When pulled from the cap stem the brush usually remains in the berry.

(3) Decay is indicated by mold, wet berries, leaky and stained containers. It is often found on berries at the stem end.

b. Storage.—(1) Temperature, 31 to 32° F.

(2) Relative humidity, 80 to 90 percent.

(3) Ventilation, free circulation of air around containers.

(4) European type is a better keeper than the American type. Under above conditions grapes of either type may be stored for 2 to 3 weeks.

15. Peaches.—There are two classes of peaches, white-fleshed and yellow-fleshed. Both these classes have varieties that are clingstones and freestones. The freestone varieties of both classes are most popular for desserts.

a. Inspection.—(1) A peach of good quality should be free from blemishes, have fresh appearance, a ground color either whitish or yellowish and sometimes combined with a red color known as blush. The red color is not a true sign of maturity. Flesh should be firm.

(2) Immature peaches lack color, often showing a green ground color. Fruit will shrivel and generally flesh becomes tough and rubbery. Overmature fruit is soft and will break down rapidly.

(3) Worm injury may be detected by unevenness of form and small drops of gum on the surface.

(4) Decay is indicated by brown, circular spots.

(5) Peaches with growth cracks are wasteful and poor keepers.

b. Storage.—(1) Temperature, 31 to 32° F.

(2) Relative humidity, 80 to 85 percent.

(3) Ventilation, free circulation of air around all containers.

(4) Peaches will keep from 1 to 2 weeks under above conditions.

16. Pears.—Pears are classified according to flesh texture. The dessert type has soft, melting, or buttery flesh and excellent flavor. The preserving type has crisp or hard flesh with pronounced grit. The dessert type only should be purchased as dessert for the Army. Pears are normally picked when slightly immature and are ripened in a cool, dark place. Flesh of tree-ripened fruit is often coarse, of poor flavor, and in some varieties very gritty.

a. Inspection.—(1) A pear of good quality should be firm but not hard, clean, not misshapen, wilted, or shriveled. Some varieties are in prime condition while still green or greenish-yellow; others may be yellow and yet be too immature for eating.

(2) Pears showing scald should be rejected. Scald is indicated by skin discoloration extending into the flesh. In severe cases the fruit is badly discolored and unattractive.

(3) Wilted or shriveled fruits indicate picking at too immature stages and they will not ripen properly. Pears with water-soaked appearance are mushy and of poor flavor.

b. Storage.—(1) Temperature, 31° to 32° F.

(2) Relative humidity, 85 to 90 percent.

(3) Ventilation, free circulation of air around containers.

(4) Should further ripening be desired temperature should be raised to 60° or 65° F.

(5) Under above conditions pears may be stored 3 to 4 weeks.

17. Plums and prunes.—A prune is a variety of plum which is suited for drying purposes. A ripe fresh prune can be separated from the pit like a freestone peach.

a. Inspection.—(1) Plums and prunes of good quality are plump, clean, have fresh appearance, should be full-colored for variety, and soft enough to yield to slight pressure. Softening at tip is generally good indication that maturity has been reached. Immature fruit is hard, generally shriveled, and of poor color and flavor. Overmature fruit is soft and often leaky. Presence of moisture or a stained container is evidence of injury, overripeness, or decay.

(2) Sunburned fruit is usually of poor quality and flavor. Sunburn is indicated by brownish or reddish-brown color on the cheek of the fruit.

b. Storage.—(1) Temperature 31° to 32° F.

(2) Relative humidity, 80 to 85 percent.

(3) Ventilation, free circulation of air.

(4) Under above conditions, fruit may be stored from 3 to 6 days.

18. Citrus fruits.—Two sets of United States Standards for citrus fruits are issued by the Department of Agriculture, one applying

to California and Arizona and the other to the remaining States producing citrus fruits.

The discolored appearance on grapefruit and oranges caused by normal color being overcast by a reddish-brown color is known as "russeting." When surface of fruit shows very little russeting it is called "bright." Russeting does not affect flavor.

Most citrus fruits grown in the United States are marketed under trade or brand names. In some instances fruit is graded according to United States grades, in others according to standards established by the packer. These grades do not necessarily conform to United States grades. Information on brands can be obtained from the Agriculture Marketing Service, Washington, D. C. When inspecting citrus fruits there is no need of inspecting fruit packed by the producer as his second grade when inspecting for U. S. No. 1.

a. Grapefruit.—(1) *Inspection.*—(a) Good quality should be firm but springy to the touch, not soft, wilted, or flabby. Skin should be smooth. Shape of individual fruit should vary from flat at stem and blossom ends to round. Elongated fruit is undesirable and wasteful.

(b) A very small amount of decay will affect flavor of the whole fruit. Decay will usually appear at the stem or blossom end.

(c) Cut fruit at stem end to examine for dryness which may be caused from being on the tree too long, or due to frost injury.

(2) *Storage.*—(a) Temperatures, 31° to 32° F.

(b) Relative humidity, 80 to 85 percent.

(c) Ventilation, free circulation of air around each box.

(d) Under above conditions grapefruit may be stored safely for 6 weeks.

b. Lemons.—California produces most of the lemons grown in this country. Since lemons are desired for their acid flavor they are harvested before fully mature.

(1) *Inspection.*—(a) A lemon of good quality should have smooth, fine-textured skin, greenish-yellow color, and be heavy for its size. Deep yellow-colored lemons are usually mature and not desirable. Shriveled or hard-skinned fruit should be rejected.

(b) Decay is indicated by mold or as a discolored soft area at stem end. Soft or spongy fruit may be affected by rot at center.

(2) *Storage.*—(a) Temperature, 55° to 58° F.

(b) Relative humidity, 85 to 90 percent.

(c) Ventilation, free circulation of air around each container.

(d) Under above conditions lemons may be stored for 2 weeks.

c. *Oranges*.—The leading varieties shipped from California are Washington Navel (November to May) and Valencia (April to December). The Navel is seedless, has thicker skin and is rougher than the Valencia and segments are separated more easily.

Varieties for Florida and Texas are about the same. Parson Brown is the principal early variety (October and November), Pineapple is midseason (January to March), and Valencia is the late (March to June).

Usually oranges received on the market in bulk are not graded or sized, and are known as "orchard run."

Oranges are washed, colored, and polished before being placed on the market. Two methods are used for coloring, gas treatments and vegetable dye. If vegetable dye is used, the words "color added" are stamped on fruit surface. This coloring method is harmless and in no way affects flavor.

Early oranges are sour and lack juice, but are good keepers. End of the season fruit is fully matured, sweet, and full of juice, but a poor keeper. If used at once the older oranges are preferred.

(1) *Inspection*.—(a) Containers should be checked for count. Oranges of best quality are firm, heavy, and have smooth, fine-textured skin. Those having a badly creased skin are puffy or spongy and light in weight, and are of poor quality.

(b) Decay is indicated by soft areas on fruit surface. Skin over soft areas is tender and breaks easily under pressure. These areas may be covered by mold. A very small amount of decay will affect flavor of the whole fruit.

(2) *Storage*.—(a) Temperature, 32° F.

(b) Relative humidity, 85 to 90 percent.

(c) Ventilation, free circulation of air around each box.

(d) Under above conditions oranges may be stored from 4 to 6 weeks.

19. *Asparagus*.—Asparagus ages rapidly after cutting, tips spread, and stalks become tough and woody. Two kinds are found on the market; bleached or white, and green. The green is most popular as a fresh vegetable. If growth is rapid a green shoot 6 to 10 inches long may be obtained before any part of it has become tough. Spears showing 4 or 5 inches of green tips and an equal length of white butt usually have been cut well below the surface and the white part may be tough and woody.

a. *Inspection*.—Asparagus should be fresh, tender, and firm, with close, compact tips. A tender stalk is brittle and is easily punctured. Green asparagus should be green for almost its entire length.

Wilted appearance or spreading tip indicates considerable time has elapsed since cutting. Stalks angular in form are tough and woody. The whole stalk with exception of an inch or two of base should be tender.

b. Storage.—(1) Temperature, 32° F.

(2) Relative humidity, 85 to 90 percent.

(3) Ventilation, free circulation of air.

(4) Fresh asparagus should not be stored over 2 or 3 days.

20. Beans.—*a. Lima (fresh).*—There are two general classes of lima beans, the large “potato” type and the small “butter bean” type. Most lima beans are shipped unshelled because shelled lima beans are very perishable.

(1) *Inspection.*—(a) Pods of unshelled lima beans should be well-filled, clean, bright, fresh, and a dark green color. Shelled beans should be plump, have tender skin, and green or greenish-white color.

(b) Pods of unshelled beans that are dried, shriveled, yellowed, or flabby usually contain beans that are tough and of poor flavor.

(c) Decay is indicated on pods by irregular sunken areas in which mold may appear. Shelled beans will show a shiny condition or mold, and those with hard, tough skins are overmature and lack flavor.

(2) *Storage.*—(a) Temperature, 30° to 32° F.

(b) Relative humidity, 85 to 90 percent.

(c) Ventilation, free circulation of air around containers.

(d) Unshelled lima beans may be held 7 to 10 days; shelled should not be stored.

b. Snap (green or wax).—(1) *Inspection.*—(a) Snap beans of good quality should be clean, fresh, firm, crisp, tender, and free from blemishes. Firm, crisp, tender beans will snap readily when broken. All the beans in a lot should be of the same maturity stage so that they will cook uniformly. Stringiness is undesirable and may be detected by breaking the bean and gently separating the two halves. Seed in pod should be very immature. If seeds are half grown, pods will be tough, woody, and stringy.

(b) A dull, dead, or wilted appearance indicates beans have been on the market for several days and are no longer of best quality.

(c) Decay is indicated by soft watery condition or mold.

(2) *Storage.*—(a) Temperature, 32° to 40° F.

(b) Relative humidity, 85 to 90 percent.

(c) Ventilation, free circulation around each container.

(d) Under above conditions snap beans may be stored for 1 week.

21. Beets.—Early beets are usually marketed in bunches, three to five to the bunch, with tops attached. Late crop beets are usually marketed with tops removed. Medium-sized beets of late crop are usually best quality.

a. Inspection.—(1) Good beets should be smooth and free from blemishes. Those rough or ridged may be tough or woody. Soft, flabby, or shriveled beets are usually of poor flavor.

(2) Bunched beets that have become too mature are tough or woody and may be recognized by a short neck covered with deep scars or by several circles of leaf scars around the top.

(3) Decay is indicated by a soft form of rot.

b. Storage.—(1) Temperature, 32° F.

(2) Relative humidity, 85 to 90 percent for bunched; 90 to 95 percent for topped.

(3) Ventilation, free circulation of air around containers.

(4) Bunched beets may be stored for 3 to 4 days, topped for 2 to 3 months.

22. Cabbage.—*a. Market types.*—The five market types of cabbage are—

(1) *Pointed*, the early or “new” cabbage and includes varieties that develop conical or pointed heads.

(2) *Danish* includes late maturing varieties and develops a hard, tight-leaved, compact head.

(3) *Domestic* includes varieties that develop heads either round or flat in shape but less compactly formed than those of the Danish type. This type includes early, midseason, and medium-late varieties.

(4) *Savory* types are finely crumbled leaved varieties.

(5) *Red* includes all red varieties.

b. Inspection.—(1) A good head is reasonably solid, firm, heavy or fairly heavy for its size. Stem should be cut close to head and all except three or four of the outer leaves should be removed. Early cabbage is not as solid as that of the late crop.

(2) Decay is detected readily by odor and slimy condition. Heads showing worm injury, decay, yellowing of leaves and burst heads should be rejected. Soft or puffy heads are poor quality.

c. Storage.—(1) Temperature, 32° F.

(2) Relative humidity, 90 to 95 percent.

(3) Ventilation, free circulation of air.

(4) Under above conditions early cabbage may be stored from 10 to 15 days, late from 3 to 4 months.

23. Carrots.—Early carrots are usually marketed in bunches of three to five carrots with tops attached, late crop carrots are gen-

erally grown to full maturity, marketed with tops removed, and are known as "topped." They are usually of deeper color and of more pronounced flavor, but may be of coarser texture or have a tough and woody heart.

a. Inspection.—(1) Carrots of good quality are firm, fresh in appearance, smooth, and a good color. Poor color indicates poor quality. Tops of bunched carrots should be fresh and green.

(2) Carrots that are wilted, flabby, soft, or shriveled should be rejected. Those excessively forked, rough, or having deep growth cracks are wasteful in preparation. Excessively thick leaf stems indicate undesirably large cores.

(3) Decay appears as soft areas which may be covered with mold.

b. Storage.—(1) Temperature, 32° F.

(2) Relative humidity, 90 to 95 percent.

(3) Ventilation, free circulation of air around containers.

(4) Bunched carrots may be stored for 7 days, topped may be stored from 2 to 4 months.

24. Cauliflower.—Leaves of cauliflower are trimmed down to within an inch or two of the curd, leaving only as many outer leaves as will afford protection to it. Size of head is no indication of quality.

a. Inspection.—(1) Good quality cauliflower is indicated by white or creamy-white, clean, heavy, firm, compact curd, with outer leaves fresh and green. Spreading of flower clusters making curd open and giving a "ricey" appearance indicates overmaturity and poor quality. Yellow leaves, particularly if they drop from stalk when handled, indicate age.

(2) Heads with spotted, speckled, or bruised curd should be rejected. Plant lice are indicated by smudgy or speckled appearance.

b. Storage.—(1) Temperature, 32° F.

(2) Relative humidity, 85 to 90 percent.

(3) Ventilation, free circulation of air around containers.

(4) May be stored 10 to 15 days.

25. Celery.—*a. Definition of terms.*—(1) *Rough celery.*—Celery packed and shipped just as it is dug, except that it has been sized, with few damaged branches and with excess dirt removed. Rough celery is also referred to as "untrimmed."

(2) *Trimmed celery.*—Same as "rough," except that stalks are washed, stripped, and trimmed of roots. Trimmed celery is bunched, usually 12 stalks to the bunch.

(3) *Stalk.*—Individual plant.

(4) *Branch.*—Individual division of stalk.

(5) *Bunch*.—Usually 12 stalks.

b. Inspection.—(1) Best celery is of medium length and thickness. It should be solid and branches brittle enough to snap easily.

(2) Pithy or stringy celery should be rejected.

(3) Center of stalks should be examined closely for blackheart by separating branches. Insects, insect injury, and seed stem can be detected the same way. Celery that has formed a seed stem is usually bitter.

(4) Freezing will cause browning and drying of tops and pithiness of branch.

e. Storage.—(1) Temperature, 31° to 32° F.

(2) Relative humidity, 90 to 95 percent.

(3) Ventilation, free circulation of air around containers.

(4) Under above conditions, may be stored for 2 to 4 months.

26. Corn (green).—Two classes of corn are found on the market, sweet and field. Field corn is usually an early maturing variety. It may be just as tender as sweet corn but does not have the sweet taste. Ears of sweet corn are usually smaller than those of field, and husks are generally darker green in color with ribbonlike ends which hang free. Husks of field corn taper and cling tightly at top of ear. Color of sweet corn may be either white or yellow, depending on variety.

a. Inspection.—(1) A good ear should have fresh, green husks and a cob well-filled with bright, plump, milky kernels just firm enough to offer slight resistance to pressure.

(2) Corn heats rapidly. Heating causes yellowing and drying out of husk and toughening, discoloration, loss of flavor, and shriveling of kernels.

(3) Examine carefully for worm injury, especially along sides of ear. Worm injury at tip is of minor importance unless it extends into kernels.

(4) Quality can best be determined by pulling back husk and examining kernel.

b. Storage.—(1) Temperature, 31° F.

(2) Relative humidity, 85 to 90 percent.

(3) Ventilation, free circulation of air.

(4) May be stored 1 to 2 days.

27. Cucumbers.—*a. Inspection*.—(1) Cucumbers for slicing should be firm, fresh, bright, well-shaped, and a good color. Flesh should be firm and seeds immature.

(2) Withered or shriveled cucumbers should be rejected as the flesh is tough and bitter. Overmaturity is indicated by puffy appear-

ance, color is dull and often yellowed, seeds hard, and flesh in seed cavity jellylike.

(3) Decay usually appears on surface as a dark, sunken, irregular area.

b. Storage.—(1) Temperature, 45° to 50° F.

(2) Relative humidity, 80 to 85 percent.

(3) Ventilation, free circulation of air.

(4) May be stored 4 to 6 days.

28. Eggplant.—*a. Inspection.*—(1) A good eggplant should be heavy, firm, free from blemish, and a uniform dark color.

(2) Wilted, shriveled, soft, and flabby eggplants are bitter and of poor flavor.

(3) Decay is indicated by dark-brown spots on surface. Worm injury is apparent on surface.

b. Storage.—(1) Temperature, 45° to 50° F.

(2) Relative humidity, 85 to 90 percent.

(3) Ventilation, free circulation of air.

(4) May be stored 7 to 10 days.

29. Greens.—The most common leafy type vegetables used for greens are beet tops, broccoli, chard, chicory, collards, cress, dandelions, endive, escarole, kale, mustard, sorrel, spinach, and turnip tops.

a. Inspection.—Greens of good quality must be fresh, young, green, and tender. Leaves poorly developed, dry or yellow, injured by insects, or showing excessive dirt, and coarse stems are poor quality. Presence of seed stems indicates age and toughness.

b. Storage.—Greens are extremely poor keepers and should not be stored.

30. Lettuce.—*a. Classes.*—Four classes or types of lettuce are found on the market, crisp-head (iceberg), butterhead, cos, and loose-leaf.

(1) Crisp-head varieties are the most important commercially. Practically all lettuce grown in the Western States is crisp-head. This type is firmer, crisper, and usually larger than butterhead types.

(2) Butterhead is the principal type grown in Eastern and Southern States. Big Boston is the leading butterhead variety grown.

(3) Cos is grown as a market garden crop near large cities. It is easily distinguished from other types by the elongated head, coarser leaf, and stronger flavor.

(4) Leaf is the nonheading type.

b. Inspection.—(1) Head lettuce of good quality should be fresh, crisp, tender, and fairly firm (butterhead) to hard (crisp-head).

(2) Lettuce with seed stem has a bitter flavor and is wasteful. A seed stem can be detected by wide spaces between outer leaves at their base and a knoblike swelling at top or side of head. If pressure is applied at this point a hard core will be felt.

(3) Decay is indicated by discolored areas on the leaves and may be trimmed with little waste. At times soft rot is found to penetrate interior of head and in this case the lettuce should be rejected.

c. Storage.—(1) Temperature, 32° F.

(2) Relative humidity, 90 to 95 percent.

(3) Ventilation, free circulation of air.

(4) May be stored 6 to 10 days.

31. Onions.—*a. Dry.*—(1) *Classes.*—Two general classes of onions grown in the United States are found on the market; the large, mild-flavored such as Bermuda and Spanish types, and the medium size, strong-flavored known as domestic or American type.

(a) The Bermuda is flat and found on the market from March to June.

(b) The Spanish or Valencia is large, mild, sweet, yellowish-brown or white in color, and usually globular in shape.

(c) The domestic or late crop onions are practically all globular and have a red, yellow, or white skin. They are good keepers and found on the market the entire year.

(2) *Inspection.*—(a) Onions of good quality should be bright, clean, hard, well-shaped, mature, and with dry skins. Those that are mature and properly cured will rattle like blocks of wood when poured from one container to another.

(b) Decay usually appears at the neck or base and may extend well into the center. Moisture at the neck indicates decay.

(c) Freezing may attack certain scales and not affect other scales of the same onion. Those thus affected are often salvaged by drying. Such injury can be detected by cutting at right angles to the scales and examining for dry, brown scale.

(3) *Storage.*—(a) Temperature, 32° F.

(b) Relative humidity, 70 to 75 percent.

(c) Ventilation, free circulation of air around containers.

(d) Late crop, 4 to 6 months. Should be stored in slatted crates or shallow, slatted bins.

b. Green.—(1) *Inspection.*—(a) Green onions of good quality have green, fresh tops, medium-sized necks well-bleached for at least 2 or 3 inches from the root, and are young, crisp, and tender.

(b) Wilting and yellowing tops as shown by flabby, tough, fibrous necks indicate age.

(2) *Storage*.—Green onions should not be stored as they are very poor keepers.

32. Peas.—Peas lose their sweetness and delicate flavor as they mature. Whatever the stage of maturity of peas purchased, they should be at the same stage throughout the lot to allow for uniformity in cooking.

a. Inspection.—(1) Peas of good quality are young, fresh, tender, and sweet. Pods should be bright green, velvety, and fresh in appearance, and well to fairly well filled. Pods of immature peas are flat and dark green in color. Pods showing maturity are swollen, of poor color, and may be flecked with grayish specks. The peas are tough and of poor flavor.

(2) Decay is evidenced by presence of mold or water-soaked appearance.

b. Storage.—(1) Temperature, 32° F.

(2) Relative humidity, 85 to 90 percent.

(3) Ventilation, free circulation of air.

(4) May be stored 1 to 2 weeks in pods.

33. Potatoes.—Potatoes of the same variety may be had as either new or old stock during late spring and early summer. These are dug before reaching full maturity and are marketed as soon as dug. Because of immaturity they will not stand rough handling or storage. The skin is broken easily and presents a feathery appearance. They are more or less soggy when cooked.

Late crop potatoes are usually mature when dug. The skin is firmly attached and has a corky appearance. When cooked they are usually mealy. Potatoes of the late crop are stored for winter and spring markets.

Potatoes are classified according to shape, as long and round varieties, and according to color, as white, brown or russet, and red. Potatoes as purchased must be of "similar varietal characteristics" which means that they will all be the same shape, color, and have similar cooking qualities.

a. Inspection.—(1) A good potato should be firm, bright, well-shaped, and free from injury caused by dirt, sunburn, growth cracks, insects, or mechanical injury.

(2) Wilted, shriveled, leathery, sprouting, or discolored potatoes should be rejected.

(3) Green color often found on the surface is a condition known as sunburn. It is caused by exposure to light in the field or storage.

(4) Potatoes sometimes have a hollow center known as hollow-heart. Another serious defect known as blackheart is sometimes found, a black, often slimy, center. It is usually the result of poor ventilation in storage or shipping. Hollowheart and blackheart can be detected only by cutting.

(5) Freezing injury is indicated by the potato being wet and leaky, or when cut it will show a black ring just within the outer surface. Such potatoes are of poor flavor and turn dark in cooking.

(6) Decay may appear as either a wet or dry rot. Potatoes with moisture on the surface should be examined closely for decay or freezing injury.

(7) Defects caused by wireworms are difficult to detect. Affected potatoes show numerous small perforations which may extend well into the potato and cause considerable waste in preparation.

b. Storage.—(1) Temperature, 36° to 50° F.

(2) Relative humidity, 85 to 90 percent.

(3) Ventilation, free circulation of air around sacks or other containers or throw bins.

(4) Mature potatoes, 4 to 6 months. Must be stored in dark room.

34. Radishes.—Varieties of radishes vary in color, shape, and size. Most of them mature in early spring and summer. A few winter varieties mature in the late fall. Winter radishes are either blackish or white in color.

a. Inspection.—(1) A good radish is well formed, smooth, firm, tender, crisp, and milky in flavor.

(2) Old or slow-growing radishes are strong flavored and flesh may be woody. They usually have coarse, dry, or yellow leaves.

(3) Pithiness may be detected by slight pressure with the thumb and finger.

b. Storage.—(1) Temperature, 32° to 35° F.

(2) Relative humidity, 80 to 85 percent.

(3) Ventilation, free circulation of air.

(4) May be stored 3 to 5 days.

35. Spinach.—*a. Inspection.*—(1) Good spinach should have well-developed, stocky plants with fresh, crisp, clean leaves of good green color.

(2) Small, straggly, or overgrown stalky plants are tough and should be rejected. Plants with yellow leaves, seed stems, or very coarse leaf stem are tough and woody.

(3) Decay is indicated by soft, slimy rot.

b. Storage.—Very perishable and should not be stored.

36. Sweetpotatoes.—There are two general types of sweetpotatoes—dry-meated and moist-meated. Dry-meated are commonly known as “Jerseys.” They have yellowish, fawn-colored skin and very light yellow flesh. When cooked they are somewhat dry and mealy. Moist-meated varieties have skins varying from whitish to a reddish color and flesh varying from light greenish-yellow to a reddish or orange tint. The Nancy Hall and Puerto Rico are the most important varieties. The moist-meated type is commonly called “Yam.”

A mixture of varieties is not desirable because of the difference in flavor, flesh color, and cooking characteristics.

a. Inspection.—(1) Sweetpotatoes of good quality should be smooth, reasonably well-shaped, firm, and of bright appearance.

(2) The most common defects are decay, misshape, bruises, and growth cracks. Badly misshapen potatoes and those with growth cracks are wasteful and undesirable.

(3) Decay imparts disagreeable flavor even if decayed portion is removed. Decay may be found as soft, wet rot, or as dry, shriveled, discolored area usually at the end. It may also appear as greenish to black spots anywhere on the surface, often in bruised and injured places.

(4) Sweetpotatoes that appear damp should be examined carefully. They may have been frozen or decayed specimens may be present.

b. Storage.—(1) Temperature, 50° to 55° F.

(2) Relative humidity, 80 to 85 percent.

(3) Ventilation, free circulation of air around and through containers.

(4) May be stored 2 to 4 months. Dry-meated varieties are much better keepers than moist-meated.

37. Tomatoes.—Tomatoes shipped long distances are picked when green but mature enough so that they will ripen properly after or during shipment, and are known as “mature green,” sometimes called “green wrap” as they are usually wrapped with paper. Those shipped to nearby markets are picked when pink, sometimes referred to as “turning.” At this stage color will vary from creamy on the blossom end to half the surface showing pink. They develop a better flavor than mature green.

Ripe tomatoes are shipped locally and should show most of the surface pink or red, be firm, and no indication of softness.

a. Inspection.—(1) Good quality tomatoes are mature, firm, fairly well-formed, plump, smooth, of good color, and free from blemish.

Catface or scars at the blossom end cause waste in preparation but do not affect flavor. Slicing should show a well-filled seed cavity, thick, meaty wall, and thin skin.

(2) Immature tomatoes appear shriveled, angular in form, and have a poor color.

(3) Puffy or watery fruit has poor flavor.

(4) Decay is indicated by wet break-down and soft, discolored spots on the surface.

b. Storage.—(1) Temperature, 40° to 50° F.

(2) Relative humidity, 85 to 90 percent.

(3) Ventilation, free circulation of air around containers.

(4) May be stored 1 week.

38. Turnips.—Early turnips are usually sold with tops attached. Late or main crop are sold with tops removed. Much of the late crop is stored for winter use.

a. Inspection.—(1) Turnips of good quality should be smooth, firm, with few leaf scars around the crown, and with very few fibrous roots at the base. Tops should be fresh, green, and young on bunched turnips. Yellowed or wilted tops indicate they have been kept in storage too long.

(2) Large, coarse, overgrown turnips, especially those light in weight, may be tough, woody, hollow, pithy, and strong in flavor.

b. Storage.—(1) Temperature, 32° F.

(2) Relative humidity, 90 to 95 percent.

(3) Ventilation, free circulation of air.

(4) Topped, 2 to 4 months. Bunched, 3 to 6 days.

39. Inspection factor table.

Article	Federal specifications	Inspection factors	Storage conditions
Apples-----	Y-A-606-----	<i>Dessert.</i> —Good color, flavor, attractive, and appealing. <i>Cooking.</i> —Slightly acid, tart, and firm. Examine for scald, rot, overmaturity, and immaturity.	31° to 32° F., 85 to 90 percent relative humidity. Good ventilation. Fall varieties, 1 to 4 months; late fall and winter varieties, 4 to 6 months.
Avocado-----	None-----	Bright, fresh appearance; fairly firm. Flesh soft and buttery. Examine for decay, bruised fruit.	42° F., 85 to 90 percent relative humidity. Good ventilation. 1 week.

Article	Federal specifications	Inspection factors	Storage conditions
Bananas-----	Y-B-91-----	Stage of ripeness; size; plump; well-filled; firm. Examine for bruises, soft, mushy, or discolored flesh, frost damage.	56° to 60° F., 75 to 85 percent relative humidity. Good ventilation. Turning ripe; 10 to 14 days.
Berries-----	Y-B-496----- Y-B-426----- Y-C-651----- Y-S-726-----	Bright, clean, fresh, plump. Examine containers for stains, mold, soft and leaky fruit.	30° F., 80 to 85 percent relative humidity. Good ventilation. 1 to 3 days.
Grapes-----	Y-G-671-----	Type, fresh, plump, good color and firmly attached to stems. Examine container for stains, frost injury, mold, wet, or leaky berries.	31° to 32° F., 80 to 90 percent relative humidity. Good ventilation. 2 to 3 weeks.
Peaches-----	Y-P-151-----	Class. Fresh with good ground color, firm, and good shape. Examine for worm injury, decay, growth cracks.	31° to 32° F., 80 to 85 percent relative humidity. Good ventilation. 1 to 2 weeks.
Pears-----	Y-P-166-----	Firm, clean, well-shaped. Examine for scald, decay, water-soaked appearance.	31° to 32° F., 85 to 90 percent relative humidity. Good ventilation 3 to 4 weeks.
Plums and Prunes.	Y-P-506-----	Plump, clean, fresh, full colored and soft enough to yield to slight pressure. Moisture or stained containers indicate injury or decay. Sunburned of poor flavor.	31° to 32° F., 80 to 85 percent relative humidity. Good ventilation. 3 to 6 days.
Grapefruit-----	Y-G-681-----	Firm, smooth skin, well-shaped, not elongated, heavy for size. Examine for decay, dryness and frost injury.	31° to 32° F., 80 to 85 percent relative humidity. Good ventilation. 6 weeks.
Lemons-----	Y-L-231-----	Firm, smooth skin, good color, heavy for size. Examine for decay, soft or spongy fruit, mold, shriveled or hard-skinned fruit.	55° to 58° F., 85 to 90 percent relative humidity. Good ventilation. 2 weeks.
Oranges-----	Y-O-661-----	Firm, heavy, smooth skin. Examine for decay, puffy or spongy fruit.	32° F., 85 to 90 percent relative humidity. Good ventilation. 4 to 6 weeks.
Asparagus-----	HHH-A-731--	Fresh, tender, firm, close compact tips green almost entire length. Angular, tough, woody stalks, undesirable.	32° F., 85 to 90 percent relative humidity. Good ventilation. 2 to 3 days.

Article	Federal specifications	Inspection factors	Storage conditions
Beans: Lima-----	HHH-B-141--	Pods well-filled, clean, bright, fresh and dark green color. Shelled, plump, tender skin, and green or greenish-white color. Dried, shriveled, yellowed or flabby of poor flavor.	30° to 32° F., 85 to 90 percent relative humidity. Good ventilation. 7 to 10 days.
Snap-----	HHH-B-156--	Clean, fresh, firm, crisp, tender, free from blemish. Seed pod immature. Dull, dead, wilted appearance undesirable.	32° to 40° F., 85 to 90 percent relative humidity. Good ventilation. 1 week.
Beets-----	HHH-B-166--	Smooth, firm, free from blemish. Rough or ridged are woody. Soft, flabby, shriveled are of poor flavor.	32° F., 85 to 90 percent relative humidity. Good ventilation. Bunched, 3 to 4 days. Topped, 3 to 4 months.
Cabbage-----	HHH-C-26---	Solid, firm, heavy for size and variety. Burst heads, soft or puffy of poor quality.	32° F., 90 to 95 percent relative humidity. Good ventilation. Early, 10 to 15 days. Late, 3 to 4 months.
Carrots-----	HHH-C-81---	Firm, fresh, clean, smooth, good color. Wilted, flabby, soft, shriveled, forked, and rough are undesirable.	32° F., 90 to 95 percent relative humidity. Good ventilation. Bunched, 7 days. Topped, 2 to 4 months.
Cauliflower-----	HHH-C-101--	White or creamy-white; clean, heavy, firm, compact curd, outer leaves fresh and green. Spreading, speckled, smudgy, bruised head with dropping leaves of poor quality.	32° F., 85 to 90 percent relative humidity. Good ventilation. 10 to 15 days.
Celery-----	HHH-C-191a.	Medium length and thickness, solid, brittle. Pithy, stringy, black-heart, seed stem, of poor quality.	31° to 32° F., 90 to 95 percent relative humidity. Good ventilation. 2 to 4 months.
Corn, green-----	HHH-C-591--	Fresh green husks, cob well-filled, bright, plump, milky kernels. Yellow, dry husks, tough, discolored, shriveled kernels are of poor quality.	31° F., 85 to 90 percent relative humidity. Good ventilation. 1 to 2 days.

QUARTERMASTER CORPS

Article	Federal specifications	Inspection factors	Storage conditions
Cucumbers.....	HHH-C-751..	Firm, fresh, bright, well-shaped, good color. Withered, shriveled, puffy, dull, yellowed, hard seed are of poor quality.	45° to 50° F., 80 to 85 percent relative humidity. Good ventilation. 4 to 6 days.
Eggplant.....	HHH-E-236..	Heavy, firm, free from blemish; uniform dark color. Wilted, shriveled, soft are of poor flavor.	45° to 50° F., 85 to 90 percent relative humidity. Good ventilation. 7 to 10 days.
Lettuce.....	HHH-L-226..	Fresh, crisp, tender, fairly firm to firm. Heads with seed stem and discolored leaves are of poor quality.	32° F., 90 to 95 percent relative humidity. Good ventilation. 6 to 10 days.
Onions: Dry.....	HHH-O-531..	Bright, clean, hard, well-shaped, mature, dry skins. Decay at neck or root, frost injury, sprouting should be rejected.	32° F., 70 to 75 percent relative humidity. Good ventilation. Shallow containers, 4 to 6 months.
Green.....	HHH-O-541..	Green, fresh tops blanched 2 to 3 inches from root, young, crisp and tender. Wilted, yellowing tops, tough, fibrous necks, undesirable.	Should not be stored.
Peas.....	HHH-P-156..	Young, fresh, tender, sweet. Pods bright green, velvety, fresh, fairly well- to well-filled. Flat, dark green pods are immature. Swollen poor colored pods are old and tough.	30° F., 85 to 90 percent relative humidity. Good ventilation. 1 to 2 weeks in pods.
Potatoes.....	HHH-P-611..	Firm, bright, well-shaped, free from injury, insect, or mechanical injury of similar variety. Wilted, shriveled, leathery, sprouted, discolored are undesirable. Examine for hollow heart, blackheart, frost injury by cutting.	36° to 50° F., 85 to 90 percent relative humidity. Good ventilation. Late crop, 4 to 6 months.
Radishes.....	HHH-R-86..	Well-formed, smooth, firm, crisp and mild flavor. Coarse, dry leaves indicate woodiness. Pithy radish of poor flavor.	32° to 35° F., 80 to 85 percent relative humidity. Good ventilation. 3 to 5 days.
Sweetpotatoes..	HHH-P-21..	Smooth, well-shaped, firm, bright and of similar variety. Badly misshapen, insect and mechanical injury are undesirable.	50° to 55° F., 80 to 85 percent relative humidity. Good ventilation. 2 to 4 months.

Article	Federal specifications	Inspection factors	Storage conditions
Tomatoes-----	HHH-T-576-	Mature, firm, plump, smooth, good color, well-filled seed cavity, thick meaty wall, thin skin. Shriveled, puffy, angular in form, poor color are undesirable.	40° to 50° F., 85 to 90 percent relative humidity. Good ventilation. 7 days.
Turnips-----	HHH-T-851-	Smooth, firm, fresh green tops. Large, coarse, and light in weight are woody.	32° F., 90 to 95 percent relative humidity. Good ventilation. Bunched, 3 to 6 days. Topped, 2 to 4 months.

SECTION IV

DRIED FRUITS AND VEGETABLES

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40. Definitions.—Trade definitions of drying terms in general use are:

a. Dehydrated.—Fruits or vegetables dried in artificially heated air under forced draft.

b. Evaporated.—Fruits or vegetables dried in artificially heated air without forced draft.

c. Sun-dried.—Foods dried entirely by exposure to rays of the sun.

d. Dried.—All dried foods regardless of means used for extracting moisture.

41. Beans.—*a. Types and kinds.*—(1) Dry beans can be procured under Federal specifications for Army use in five types, A, B, C, D, and E. Invitation for bids may specify a particular type and further specify a particular kind within a type, for example, type A white, small white; type B, red kidney, Western red kidney. The kinds authorized under each type are named in Federal specifications.

(2) The table given below will assist inspectors in identifying the various kinds of beans named in specifications and standards.

Name	Size	Shape	Color	Source
Great North- ern.	Large-----	Oval-----	Pure white----	Idaho, Mon- tana, Wyo- ming.
Large white---	Larger than pea.	Oval-----	Pure white----	California, Ida- ho, Mon- tana.
M e d i u m white.	Between small and large.	Oval-----	Pure white----	M i c h i g a n , New York, Wisconsin.
Small white---	Very small----	Oval, narrow--	Pure white----	California, Ida- ho, Mon- tana.
Pea-----	Small-----	Oval, round---	Pure white----	M i c h i g a n , New York, Wisconsin.
Red kidney---	Twice as large as medium white.	Kidney-shape--	Red-----	C a l i f o r n i a , Michigan, New York.
Dark red kid- ney.	Same as red kidney.	Kidney-shape--	Mahogany----	Michigan.
California red	Medium-----	Kidney-shape--	Dark red-----	California.
Pink-----	Medium-----	Flat, oval----	Light red-----	California.
Pinto-----	Slightly small- er than pink.	Kidney-shape--	Buff, specked with brown.	Colorado, New Mexico, Cal- ifornia, Ida- ho, Mon- tana.

(3) There are two kinds of lima beans, regular and baby. Both are flat and round in shape (one large, the other small), and are pure white in color.

(4) Blackeye beans are commonly known as "cow peas." Despite the name it is a bean, and can be distinguished by the black spot or eye on the concave surface.

(5) The commonly used term "Navy bean" is not used in Government publications, being now obsolete. The term "Navy" was and still is used by some to indicate type A. The chief disadvantage of using the term "Navy" is that it fails to differentiate between the various kinds of white beans.

b. Inspection.—(1) *Type, kind, and grade.*—Inspection involves, in addition to the general features of condition, net weight, etc., two features peculiar to dry beans, the particular type and kind specified, and the grade specified.

(a) *Type and kind.*—For type and kind, it is necessary to have either experience or standard samples.

(b) *Grade.*—For grade, it is essential that the inspector have a copy of "Handbook of Official United States Standards for Beans." This handbook may be obtained from Agricultural Marketing Service, United States Department of Agriculture, Washington, D. C. The handbook gives allowable percentages of various grading factors, definitions, etc., and should be read carefully. The inspector should also provide himself with a copy of Federal specification for Beans, Dry.

(2) *Shipment.*—(a) *Cars and bags.*—In inspecting freight shipments, care should be taken to see that cars used were clean and watertight. If soot or dirt was not carefully removed it will sift through the bags and soil beans so that their appearance will be damaged permanently. Leaky roofs result in stained and unsightly beans. Specifications call for new sacks. Stained sacks are often evidence that they have been wet and contents injured. Bags showing moist or discolored spots should have contents carefully examined for damaged beans.

(b) *Samples.*—After noting general condition of shipment and carefully inspecting any abnormal portion, a representative sample of the entire lot should be taken. For this purpose bags are selected from various parts of the shipment and samples taken from all parts of bags selected.

(3) *Moisture.*—Excess moisture is a serious trouble in new beans. Those with more than 17 percent moisture are termed "wet" and should not be accepted as they become musty, do not store as well, and do not contain as much food to the pound as dry beans.

Dry beans are plump and firm under pressure; they should not be dented when pressed with the thumbnail. Another good test is to lay beans on a table and try to cut with a sharp knife at right angle to longer axis. If the knife goes through in an easy manner without immediate cracking open, as a rule the bean contains an excessive amount of moisture and the lot should be examined more carefully.

(4) *Physical properties.*—Good beans are dry, plump, uniform in color, and have a strong, glossy skin. Those too hard, either because they are old or naturally hard and tough, are undesirable. Small and hard beans require a long time to soak and do not cook well.

(5) *Insects.*—Weevily beans are not acceptable under specifications. Weevils deposit small white scales (eggs or excreta) on the outside. These may be seen with the naked eye, but a hand lens aids in recognition. Weevils develop within and eat their way out. Cut the sus-

pected beans open and look for larvae. Before weevils emerge, small spots ($\frac{1}{16}$ -inch diameter) appear and show where they are about to come out. A good test to detect presence of weevils and similar insects is to put a lot in water for about 2 hours. Insects present will come out and float on top of the water.

42. Rice.—Like beans, in the inspection and grading of rice it is essential that an inspector provide himself with a copy of Federal Specification for Rice and also a copy of United States Standards for Milled Rice.

Some of the commonly used terms or definitions for rice products are—

a. Rough or paddy is the threshed grain firmly enclosed in the hull.

b. Brown is rice freed from hulls, but containing practically all bran coats and some germs.

c. Partly milled, medium milled, under milled is rice from which a portion of outer bran layers and practically all germs removed, but still containing an appreciable amount of bran layers.

d. Milled is rice from which practically all bran layers have been removed.

e. Unpolished is milled rice containing considerable portion of bran coats. Brown rice is properly designated as unpolished.

f. Polished is milled rice from which all bran coats have been removed.

g. Uncoated polished is a completely milled rice to which coating materials have not been added.

h. Coated is polished rice to which coating materials have been added such as talc or starch.

i. Head is milled rice consisting of a large proportion of whole grains.

j. Broken is milled rice containing a large proportion of broken grains.

k. Second head is broken rice consisting of comparatively large pieces.

l. Screenings and brewers' rice or grits are broken rices consisting of comparatively small pieces.

m. Wild is rice which grows in lake and swamp areas and produces a dark, uneven grained, unpolished rice used as an accessory in cooking, especially for wild duck. It has not become a commercial article of great yield and is only procurable at certain times.

n. Byproducts are hulls, bran, pearling cone meal, and polish.

For additional definitions, see United States Standards for Milled Rice. The definitions mentioned herein are not shown in United States Standards.

The fact that rice is weevily does not affect the grade. A sample could be weevily and still grade U. S. No. 1. The word "weevily" is added to the grade certificate. Even though a rice graded U. S. No. 1, it could and should be rejected if offered for delivery to the Army under Federal specifications provision which requires that rice be clean and sound.

43. Storage.—Insects breed in stored dried vegetables; therefore, if insect-free products are stored in the same warehouse where infested products recently have been stored, the new products may become infested. To prevent insect pests is a matter of good warehousing, and good preventive measures are—

a. Pile or stack on dunnage.

b. Absolute cleanliness. Keep out dirt, allow no accumulation of debris, cobwebs, piles of sacks, papers, and other litter. Dispose of all sweepings.

c. Cool, dry, and well-ventilated storage. Temperature below 43° F. will prevent development and growth of insects. It is not necessary to maintain temperature below 40 F. for this purpose.

d. Careful inspection of all newly delivered stores for insects, and isolation and treatment of suspected lots.

e. Frequent inspection of stock.

f. Rotation of storage location when practicable.

g. Prompt attack when insects of any type are found. Insect-infested products should be surveyed with a view to their condemnation and removal.

44. Fruit.—*a. Specifications.*—Federal specifications have been promulgated for the following dried fruits:

- (1) Apples.
- (2) Apricots.
- (3) Currants.
- (4) Dates.
- (5) Peaches.
- (6) Prunes.
- (7) Raisins.

An inspector should provide himself with above-mentioned specifications and study them carefully.

b. Samples.—Due to variation in quality and to lack of uniform grades for the several products, it is believed that in inspection of dried fruits comparison with sample of known satisfactory commercial quality be made.

In obtaining a sample for inspection, sufficient boxes should be selected at random so that they are fairly representative of the whole

shipment. Trade practice is to examine 3 percent of each shipment. Boxes should be opened by removing bottoms so that appearance of facing, if present, will not influence the inspector in determining actual quality.

For sample to be representative of the lot from which drawn, the fruit should be mixed thoroughly, piled in a heap, and quartered. By rejecting opposite quarters, repiling and requartering until a workable amount is obtained, a truly representative sample results.

c. Inspection.—Actual inspection of any lot is based upon the following factors:

(1) *Texture.*—Except for very soft and sugary products such as dates, figs, etc., texture should be springy and pliable. When a handful of fruit is pressed tightly together, pieces should immediately fall apart when the hand is released. It should never be possible to press moisture from any freshly cut surface. If the fruit seems soft, mushy, or wet, and sticks together when pressure is released, moisture content is probably 25 percent or more. If fruit seems springy and when the pressure is released separates in a few seconds to form pieces of approximately original size and shape, moisture content is about 20 to 24 percent. In case of doubt as to moisture content, examination should be made in a chemical laboratory. Maximum moisture content for dried fruits allowed by Federal specifications is 24 percent.

(2) *Color.*—Color should be clean, bright, uniform, and typical of the variety. Desirable colors for the several fruits are—

- (a) Apples, fairly white and bright.
- (b) Apricots, golden yellow to orange.
- (c) Currants, purplish-brown but rather dull.
- (d) Dates, lustrous, golden brown.
- (e) Figs, brownish-white for white varieties.
- (f) Peaches, golden orange.
- (g) Prunes, dark brownish-purple to jet black, with or without a bluish luster; meat light to golden brown.
- (h) Raisins, seeded, shiny, purplish-black to dark brown. Seedless, light brown to brown.

Many fruits are sulphured to produce brighter and more uniform color. Unsulphured have better flavor than sulphured, but soon become dark and unsightly in appearance.

(3) *Soundness and cleanliness.*—Fruit should be free from dirt, sand, leaves, twigs, and other foreign materials apt to be taken up through handling and storage in unclean storerooms. All packages should be whole and intact. Moldy or mildewed products are not

acceptable. A few dried fruits, especially prunes, dates, raisins, and figs will show whitening or yellowish-whitening on the outside of packages or on fruit when stored for sometime or in warm places. If hard and crystalline, this is merely natural sugars and flavor of the fruit is not affected. However, this should not be mistaken for mold which is threadlike, fuzzy, and soft.

(4) *Insects*.—Dried fruits are attacked readily by weevils, sugar mites, and flies. Infestation on receipt of any shipment can be detected by spreading out contents of one or more packages. Weevils are small and a dark brown color. Their larvae are white and wormlike. Cocoons and a brownish material resembling sawdust will generally indicate that product is infested with weevils.

(5) *Size and form*.—In many cases size of fruit and form of pieces determine grade. Broken pieces and uneven halves are always objectionable. Mashed fruit and slabs are generally made from over-matured fruit. These are so soft and sticky that they become mashed together and are always objectionable.

(6) *Odor and flavor*.—Odor and flavor should be sweet, fresh, and typical of the variety. Green fruit dries hard and does not have a desirable sweet flavor. While sulphuring affects flavor it is not objectionable unless excessive. Fruits which have a decided sulphur flavor should not be accepted, though the quantity present may not be deleterious. When time is available it is well to stew all samples in order to obtain true odor and flavor.

d. Storage.—Well-ventilated storage at a temperature of not over 60° F. is essential for proper keeping of all dried fruits. They readily take up moisture in damp storage and excess moisture favors mold growth. Heat favors insect growth as well as mold and bacterial development. Wherever practicable dunnage should be employed. Dried fruit should never be stacked on cement floors without dunnage.

Prunes and whole raisins are the best keepers of all dried fruits due to being whole and having a high sugar content; peaches, apricots, pears, etc., are only medium keepers; while evaporated apples are the poorest. As dates sweat profusely when removed from cold storage and thus destroy appearance of any carton in which they may be packed, it is customary to keep them in a cool, dry place but not in cold storage.

All dried fruits tend to take up odors and hence should not be stored or shipped in proximity to tobacco, kerosene, soap, etc.

SECTION V

LEAVENING AGENTS

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45. Yeast.—*a. Types.*—The inspector of subsistence is concerned with two types of yeast, compressed and dried.

(1) *Compressed yeast* is a pure culture of bread yeast grown in large quantities and compressed into cakes. Color is not an accurate guide to quality because material used and production methods affect it.

(2) *Dried yeast* is prepared by mixing yeast with a large proportion of starch or corn meal and drying the mixture at a comparatively low temperature. Under these conditions it will go into spore form where it is inert and will keep under ordinary storage for several months. It can be carried to places remote from transportation and cold storage facilities. Further information on the subject is contained in TM 10-410 (now published as TM 2100-151).

b. Inspection.—Compressed yeast should feel firm, tough, and springy. It should break with a snap and leave a clean fracture. It should have a good yeasty odor and be practically tasteless. Softness or flabbiness and darkened areas indicate spoilage. Dry and crumbly areas indicate poor storage and age. Yeast injured by frost is soft and watery. Spoiled yeast has a sour or putrid odor.

c. Storage.—(1) Compressed yeast must be kept under refrigeration. The best storage temperatures are from 35 to 45° F. Under such conditions it may be stored 1 week.

(2) A good storage maximum for dried yeast is 3 months in a dry, cool place.

46. Baking powder.—*a. Classification.*—Baking powders are classified by the baking powder industry according to their acid-reacting ingredients. These classes are—

(1) *Tartrate powders*, in which potassium acid tartrate (cream of tartar), with or without addition of tartaric acid, is the acid-reacting ingredient.

(2) *Phosphate powders*, in which monocalcium phosphate or monosodium phosphate is the acid-reacting ingredient.

(3) *Sodium aluminum sulphate powders*, in which sodium aluminum sulphate is the acid-reacting ingredient. Also known as SAS powders.

(4) *Combination powders*, in which the acid-reacting component is composed of sodium aluminum sulphate and calcium acid phosphate. Also known as "double-action."

(5) *Pyrophosphate powders*, in which the acid-reacting ingredient is sodium acid pyrophosphate.

b. Action.—(1) Tartrate powders are quickest in action. They react very rapidly and completely in the cold and do not require heat to complete evolution of gas.

(2) Phosphate powders are intermediate in action. Practically all gas is evolved in cold dough but evolution of gas is much slower than in tartrate powders.

(3) Sodium aluminum sulphate powders produce very slow reaction in cold dough and require heat to complete action.

(4) Combination powders get their "double-action" from the phosphate which begins to evolve considerable volume of gas as soon as the batter is mixed and this reaction is carried on by the sodium aluminum sulphate during baking.

(5) Pyrophosphate powder greatly resembles combination powder except that in the cold pyrophosphate reaction is slower and more prolonged.

c. Containers.—Packaging of baking powder is an important item. The container must be moistureproof and a type that permits closing after each use. The most satisfactory containers are tin cans with slip covers or friction tops.

d. Inspection.—The most important thing to look for is evidence of deterioration. Deterioration is manifested by powder being lumpy or caked. Foreign material may be detected by sifting a representative sample through a very fine mesh cloth. Because of strict enforcement of the Pure Food and Drug laws, the statement of ingredients shown on the label usually is accepted as accurate. In case of doubt as to purity or quality, a sample should be sent to a depot for analysis. Powders containing hard, pellet-like bodies are seriously damaged and should not be accepted.

e. Storage.—Baking powders must be stored in a dry place and protected from sudden drastic changes of temperature and contaminating odors. Any well-made baking powder, properly packaged, should keep for 1 year under ordinary storage conditions.

SECTION VI

CEREALS AND CEREAL PRODUCTS

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47. Definitions.—Cereals are grasses yielding farinaceous grains. Under common usage the term “cereal” is applied to edible products made from such grains. In order of stability in storage, they are classed in this manual as “raw” and “prepared.”

a. Raw cereals.—Flour, corn meal, farina, rice, rolled oats (regular and steel cut), and barley. Of these, the most perishable is “water-ground” corn meal which has not been degerminated. All these cereals are subject in varying degrees to rancidity development and insect infestation.

b. Prepared cereals.—All cereals which have undergone any cooking, malting, artificial flavoring, or treatment with acids or alkalis. This class includes quick-type rolled oats and ready-to-eat cereals.

Inspection revealing any indication of either present or past infestation should result in rejection.

48. Flour.—*a. Definition.*—The word “flour” unmodified is defined as a product made by bolting wheat meal. The word flour is not used unmodified to identify products made from other grains or vegetables. For example, the product made from bolting rye meal is properly identified as “rye flour.”

b. Wheat.—(1) *Types.*—Flours having varying baking characteristics made from different types of wheat are classed roughly according to their suitability into—

(a) Type A, bread flours, made from blends of hard wheat.

(b) Type B, blends or general purpose flours, made from blends of hard and/or soft wheat.

(c) Type C, soft or pastry flour, made from blends of soft wheat.

These types vary in several respects, the most important of which is variance in proportions of two proteins, glutenin and gliadin, together commonly known as gluten. It is the quality of this constituent which determines whether the flour in question will produce

a loaf of bread having good volume and texture. A strong flour is one which has sufficient good quality gluten to enable realization of maximum good effect of the leavening agent in producing a loaf of bread of good volume, texture, and symmetry. A weak or soft flour will produce a product of close, even grain without realization of large volume and is therefore best suited for use in baking cakes and certain other pastry products.

(2) *Purification classification.*—Another important factor which will influence ultimate character of the bakery product is degree of purification which the flour has undergone. Flours usually are classified further by their purification of bran particles into patents, straight, clear, and low grade. In simplest explanation it may be said that the higher the grade, the greater the degree of bran removal. Other factors remaining constant, increased bran removal results in general lowering in quantity and rise in quality of gluten. A short patent flour is one in which the most complete refining has been effected. In order of grade, long patent, straight, and clear represent lower grades. Since straight flour which includes short and long patents and first clears will produce a loaf of good volume, color, and texture, it is used as a ration component in the United States Army.

(3) *Age.*—Ordinarily, flour is not milled until immediately before delivery. Therefore it is not to be expected that new will produce as good volume and texture in baking tests as will that which is 2 weeks or more old. However, "green" flour, that milled from immature or improperly prepared grain, will not improve appreciably with age and will not produce a loaf of good volume. Green flour is not suitable for Army use.

a. Inspection.—(1) *Field.*—Field inspection of flour includes—

- (a) Condition of truck or car in which flour was transported.
- (b) Condition of flour and containers.
- (c) Absorption test.
- (d) Baking test.

(2) *Car or truck.*—Any car or truck used for transporting flour must be clean, free of all odors and of insect infestation. Floors and walls to a height above top stacking of containers should be covered with heavy paper which will not permit contents to come in contact with floor or walls. The center section of a car should be so stacked that usual load shifting always attendant with shipping will not cause interference with doors of car or truck. Frequent and annoying damage to sacking may result from such improper loading.

(3) *Flour and containers.*—On receiving a shipment, particular attention should be given any foreign odor and attempt be made to

identify it. Inspectors must be careful not to confuse characteristic sack odors with foreign odors. Any odor which persists in flour after a thorough airing should be cause for concern. On baking a sample loaf of bread made of suspect flour, if no deleterious effect is noticed the flour should be considered sound. Flours having odors which can be attributed to decomposition either animal or vegetable in origin are not acceptable. Sound flour should possess an odor closely akin to that of freshly ground sound wheat. Objectionable odors usually encountered are those resembling garlic or mustiness. A "baggy" odor may result from shipment in outside bags made of burlap. A musty odor is detected more easily in the baked product than in the flour itself.

d. Tests.—Flour tests are made by both laboratory analysis and physical examination. The latter involves a test for gluten, color, absorption, and baking qualities.

(1) *Gluten.*—Gluten is a complex combination of two protein substances which on contact with water forms an insoluble mass of matter which, when expanded by development of gas in dough, provides a skeletal support for the carbohydrate substances in bread. Without gluten bread could not be developed. Gluten can be formed and recovered in examinable form by washing starch from flour, using ordinary water as a solvent. The procedure is as follows:

Extract a 25-gram sample of flour to be tested. Add sufficient cool tap water to obtain dough of consistency permitting manual manipulation. Immerse ball of dough in water for 30 minutes. Extract and knead over a fine meshed screen under a stream of cool water. Continue kneading until water passing over dough shows no milky discoloration. Remaining product is gluten, and this is then examined for color, tensility, and stickiness:

(a) *Color:*

1. Hard patent flour, pearl gray.
2. Hard straight flour, dull pearl gray.
3. Hard clear flour, dull gray.
4. Soft flour, light creamy.

(b) *Tensility.*—Upon stretching into rectangular shape gluten should permit considerable elongation before holes and tears appear. Lack of stretchability indicates poor quality gluten.

(c) *Stickiness.*—Gluten not readily transferable from hand to hand but becomes sticky is not sufficiently good quality to be stable in dough. Production of a well-defined loaf of good volume is not possible with above quality. A straight flour such as commonly used by the Army (extra long patent) of about 97 percent extraction

should yield gluten of a color slightly darker than the pearl gray of hard short patent but not as dark as that of hard clear flour. It should not be sticky and should possess good tensile strength.

(2) *Color*.—Color is determined by the “pekar test” (slick test). This test is of more value when made on a comparative basis with a known type. Place sufficient flour on a smooth glass to permit packing into a smooth mass about 2 inches wide tapering in thickness from about $\frac{1}{4}$ -inch in thickness on the more distant side to the thinnest possible film on the forward edge of the glass. A spatula or any smooth piece of metal pressed on top of the sample and drawn toward the forward edge of the glass, using forward edge of the glass to scrape flour from the spatula or metal, will suffice. The sample to be compared should be “slicked” or similarly placed at the side of the first sample and treated similarly so that the two samples are in contact. Any great difference in color is readily discernible by a clear line of demarcation between the two samples. By carefully sliding the glass plate under the surface of still water, the difference in color if any becomes more pronounced. Comparison must be completed before samples dry. Color most desired is a rich, creamy white. Flours of longer separation or patent will contain an increasingly greater percentage of bran specks until the clear grade is reached. In this grade the greater amount of bran blends with the whiteness of the flour to render a product of a decided dark or dirty white appearance.

(3) *Absorption*.—Ability of flour to absorb water is of prime importance, both as an indication as to specification compliance and possible alteration in dough formulas used in bakery practice. A type A or hard wheat flour having an absorption power of less than 58 percent by weight is not acceptable. To determine absorption power, weigh out 25 grams into a suitable container, add water slowly from a graduated burette, stirring with a spoon or the handle of a knife until dough of proper consistency has been obtained. Care must be exercised that no flour is spilled and that no flour or water is left in the dish unincorporated in the dough. Multiply by 4 the number of cubic centimeters of water used. The result is the percentage absorption of the flour.

(4) *Baking*.—(a) The final and most important test of flour is the baking test. This test is best conducted by comparison of test loaves until the inspector is expert in bread scoring.

A sample loaf is baked from flour of known quality and is compared with a sample loaf baked from the unknown flour. To be of value these loaves must be produced under identical circumstances.

In the instance of varying absorption ability, a second sample loaf made from the unknown flour with moisture content as determined by the absorption test is also compared. These samples are weighed immediately after being taken from the ovens and the weights compared.

(b) For procedure in baking test see TM 10-410 (now published as TM 2100-151).

e. Containers.—Although the 196-pound net barrel is still the unit in flour milling calculations, this container has been almost entirely superseded by the 98-pound sack for bakers' use and small sacks for household use. The 140-pound sack is generally used for export. Some large flour users own their own sacks and use them continually.

f. Storage.—(1) *General.*—(a) Flour should be stored in a cool, dry, well-ventilated room which is open to sunlight. It is very sensitive to odors from other substances and will readily absorb them. It should never be stored in the same room with substances giving off odor.

(b) Being hygroscopic, flour will absorb excess moisture present in the storeroom or lose some of its natural moisture in very dry surroundings.

(c) A uniform and not too low temperature is best. It is desirable to keep the temperature near 70° F. It may be necessary in hot climates to keep flour in cold storage to keep down insects, a temperature of 42° F. being best for this purpose, but the cold storage should be as dry as practicable. A chilled flour should always be brought to near 70° F. before endeavoring to use it in dough, and this should be done gradually by exposure to room temperature. High storage temperature (85° to 95° F.) combined with high humidity, a condition found in tropical climates, is most unfavorable. These conditions are ideal for development of molds and bacteria and action of enzymes. In addition to causing moldiness and mustiness, these organisms tend to break down proteins, thus lowering and eventually destroying its bread-making qualities. Rancidity may also occur, especially in whole grain or low-grade products where fat content is considerably higher than in straight or patent flour.

(2) *Tropics.*—Storage of flour or any other mill product is always a problem in the tropics. In most tropical countries there are two seasons, wet and dry, which vary considerably in their intensity. With the exception of rice, most grain products must be imported.

(a) *Molds, bacteria, and insects.*—In addition to development of molds, bacteria, and enzymes, growth of insects and action of natural acids of the products are all favored by the temperatures of from 80° to 90° F. so common in the tropics. Natural humidity of these

localities greatly favors development of molds and bacteria, and in addition causes oxidation of meal containers.

Insects, a factor of such a climate, produce very great deleterious effects. They remain dormant at temperatures of 43° F. or below; at 60° to 70° F. grow and multiply slowly; at 80° to 90° F. grow, eat, and multiply very rapidly; in fact, the latter is the optimum temperature for insect growth. The confused flour beetle, the typical insect infesting flour, will probably live one or two generations in the temperate zone and during the winter it will become dormant and die. In the tropics it would probably live four generations, each time multiplying three hundredfold. The same relation exists in growing molds and bacteria, except that moisture is more essential to their growth as they absorb their food by process of osmosis.

(b) *Sacked*.—On account of above factors, sacked flour should under no circumstances be held over 2 months during the wet season and 3 to 4 months during the dry season. It is probably 30 days old when received.

(c) *Canned*.—It would appear that no reason exists why hermetically sealed canned flour could not be kept almost indefinitely, but it must be taken into consideration that some mold and bacteria exist in all flour. For this reason, it is believed that the 13.5 per cent moisture now allowed for flour is too high for canned flour for tropical use. It provides part of moisture and warmth naturally present. The great deterring factor in storing tinned or canned flour is that inspection has so far been incapable of obtaining flour free from insect infestation. In manufacture, it passes through sieves which are smaller than insect egg and therefore as it leaves the final dressing reel or sieve, if that reel or sieve is free from holes, the flour is free from insects or eggs. Infestation therefore takes place somewhere between that reel and the can in which the flour is packed and sealed. If one pair of eggs or a single impregnated female insect gets into the can, that can will be infested badly when it is opened 6 to 9 months later. Keeping reserve supplies in the tropics often requires that flour be held that long or longer. If examination of canned flour shows it to be insect infested the purchasing officer should be notified, giving the date and name of contractor so that remedial steps can be taken on future contracts.

It must not be assumed that insect infestation destroys flour. On the other hand, it certainly never helps it and does affect it deleteriously. Unless infestation is unduly severe, it should be

sifted (bolted) and used, resulting in some loss. Badly infested flour should be used for other purposes than human consumption.

(3) *Sack arrangement*.—Sacked flour should be arranged so as to facilitate proper ventilation, to allow cleaning floors under piles, and to control rats, mice, and insects. There should be an air space between sacks by means of cross-piling. Sacks should be spread over as large an area as possible to insure maximum exposure of each to the air. Stowing flour tightly in high stacks not only prevents access of air to the sacks, but compresses the flour on the bottom of the stack so that it packs down hard and prevents penetration of air into the sacks. Compression destroys baking qualities. This is more serious in case of soft wheat flour as it packs more solidly than hard wheat flour, and is still more serious in case of lower grade flours which tend to heat and spoil more readily. Under unfavorable temperature and humidity conditions such as in the tropics or in the southern parts of the United States, stacks should not be piled higher than six sacks, and under favorable conditions not higher than eight sacks. Stacks should be spaced 18 to 24 inches apart in all directions.

(4) *Keeping qualities*.—Age and proper storage have a tendency to whiten flour and improve quality. If properly stored it may be kept in good condition for a year, but storage beyond this time causes a loss of flavor. Patent and straight flours will keep better than those containing outer bran coatings and germ stock. The latter is very oily and prone to rancidity. Graham, whole wheat, rye, and barley flours, bran, and feeds do not keep nearly as well as straight flour unless sterilized package goods. The latter should never be kept on hand over 3 months.

(5) *Rats and mice*.—Ordinarily rats and mice will not eat flour as it forms a paste in their mouths. However, they will build nests in sacked flour. This can be prevented by placing paper between the sacks when stowing, as they will use the paper for nests and will not molest the sacks.

49. Corn meal.—*a. Definition*.—Corn meal is only a refinement of hominy grits (a corn product) as can be seen by the fact that hominy grits, fine, will pass through a No. 16 sieve but over a No. 28, while granulated corn meal will pass through a No. 22 wire sieve and over a No. 72 grits gauze. Granulated corn meal is meal from which the greater part of the germ is removed and which by repeated reduction in roll mills has been reduced to an evenly ground, finely divided state. Any further reduction would result in corn flour.

b. Storage.—Corn meal, if kiln dried, will keep 6 months if stored in temperature not greater than 70° F., and provided it is not subjected to infestation while in such storage. Water-ground meal, because of its high oil and protein content, will not keep even under optimum conditions longer than 90 days.

c. Inspection.—Granulated corn meal should be free of all pieces of bran, chaff, soft floury material, hulls, germ, or other foreign material. Corn meal, either white or yellow must be a uniform bright color. Particles must be clean, hard, flinty, and evenly granulated endosperm.

d. Hominy grits.—Inspection factors for hominy grits are identical with those for corn meal except that granulations are larger.

50. Wheat farina.—This product must be a uniform, rich, creamy color free from bran specks. It must have uniform granulation devoid of flouriness.

On cooking, resulting product should possess fresh, wholesome, typically wheat flavor and odor. In body, it should be tender but softly granular with good substance. There should be no indication of grittiness or sliminess. It should retain original, uniform creamy color.

51. Rolled oats.—Rolled oats, in addition to general requirements of other unprepared cereals, must be a uniformly bright creamy color and flakes should be uniformly large. There should be almost no powder or finely granulated stock. Artificial flavoring is not permissible. The product must be free of rancidity, bitter flavor, musty or other undesirable odors, and must be free from hulls, weeds, seeds, sticks, stems, burnt flakes, wheat, and barley. Flakes should be uniformly light brown in color. Dark or pale flakes or flakes with frayed or uneven edges are not acceptable quality. Flakes must be sufficiently thick to retain body on cooking. Hard, flinty flakes or thin, fragile, soft flakes are undesirable.

On stirring in boiling water for 3 minutes the product must have a fresh, sweet, true oat flavor and odor. In body, the product must be tender and flaky with substance or body sufficient to afford chewiness. There should be no bitter, rancid, stale, raw, or burnt flavors and no mushiness, excessive sliminess, viscosity or toughness.

Quick-type rolled oats, a partially prepared cereal product, is subject to all inspection factors which are applicable to regular rolled oats. However, it is to be anticipated that quick-type will present a slightly mushier and less flaky appearance on cooking than do regular due to prior processing (partial cooking).

52. Barley.—*a. Grades.*—Pearled barley is divided into two grades as to quality and five grades as to size. First grade barley has a small area of bran coat remaining in the crease. It is uniformly round and without broken grains. The second grade will have considerable bran coat in the crease and may have a small area of the remaining surface covered by bran. Adulteration by addition of grains other than barley or by addition of any foreign material is not permitted.

b. Sizes.—In size barley should be No. 3 or No. 2 as specified in invitation for bids. Sizes are as follows:

Grade number	Approximate size of screens	
	Through number	Over number
3/0-----	9	11
2/0-----	8	10
2-----	7	9
3-----	6	8
4-----	6	7

c. Pearled.—Pearled barley must be uniform size, light yellow to white in color for portage grade (1st grade) and light yellow to slight brown for chester or pot grade (2d grade). Individual kernels should be unbroken, well-rounded with definite pearling or polishing on all sides. Kernels pearled only on ends are not acceptable. There should be few if any stained or black grains. On breaking, individual kernels should reveal flinty interiors with no tendency toward floury or soft centers.

Cooked barley should possess a fresh, wholesome barley flavor devoid of flat, raw, stale, or otherwise foreign flavor. Cooked grains should be softly granular, tender, well swollen but should retain their original shape. In color, the cooked product should be an even, creamy white.

d. Containers.—Containers should be acceptable commercial type or as specified in invitation for bids, but in all instances must provide necessary protection against moisture and insure clean, dustproof packaging.

e. Storage.—Barley is subject to infestation and damage by the same agencies which would be harmful to corn meal or oat meal. All these cereals should be stored in a cool, dry, well-ventilated place open to sunlight. Cereals should never be stored near other products known to be infested. Wherever possible dunnage should be used. With

exception of rice and barley, cereals showing more than very slight infestation are not fit for human consumption.

53. Prepared cereals and mixes.—*a. Cereals.*—(1) *Moisture content.*—Specifications for ready-to-eat cereals require moisture content not above 5 percent. Determination of moisture content cannot be made by organoleptic means since crispness, flakiness, and most other physical attributes which are commonly thought dependent on low moisture content do not necessarily hold true. Ready-to-eat cereals of various types, flaked, malted, shredded, etc., all have breaking points at a moisture content higher than 5 percent and varying in percentage within each type.

(2) *Inspection.*—Cereals are inspected most easily in natural light. Inspection must cover odor, taste, crispness, palatability, and general physical condition of container and contents. To detect off-odors cut a small triangular opening sufficient to permit the nose to come in close proximity to the carton contents. Shake contents well. Immediate smelling will permit detection of any foreign or disagreeable odors. Contents should be protected from glue-bearing surfaces as well as from containers made of low grade carton board by inside protective liners, the only exception being certain shredded wheat products which may be packed in contact with carton board of a type specified by Federal specifications. In appearance contents should be uniformly toasted or cooked and should be practically free of all burned, scorched or pale stock. Foreign material of any type is not permitted. Although rare, insect infestation if present in any degree whatsoever will not be tolerated. Flakes or puffed grains or formed shreds or shredded biscuits should be of uniform size. Excessive finely reduced or powdered flakes or undeveloped puffed grains are cause for rejection. Manufacture of breakfast cereals is a highly developed industry, and it is to be expected that products will be virtually perfect in all respects. Dirty stock will not be permitted in the slightest degree. On tasting the product, a pleasing characteristic flavor should be experienced which after a few moments does not develop any "soapy" or alkaline reaction to the palate. The product should not be tough or flinty but should be crisp and readily chewable. After thorough chewing, the mass of cereal should not adhere stickily to the mouth but should be swallowed easily. A tough cereal ordinarily will become an adhesive mass which resists movement by the tongue in the process of deglutition. A tender and crisp cereal is reduced readily to fine particles in the mouth and in no way tends to be sticky or difficult to swallow. Most breakfast cereals are adversely affected by light and if stored for long periods subjected to light will be discolored or will develop undesirable odors.

(a) *Puffed rice*.—Individual puffed grains should be uniform, nicely rounded, smooth-surfaced kernels having a polished white sheen on the surface and a characteristic bean shape. Stock which is mashed, cracked, specked, rough, brown in color, dirty, or uneven in color is not acceptable. Toughness, foreign odor and flavor are cause for rejection.

(b) *Puffed wheat*.—Kernels should be uniform light color and size. Toughness, foreign odor and flavor are not permitted. A well-prepared product contains few if any mashed kernels and is reasonably free of chaff. Dirty stock is not acceptable.

(3) *Storage*.—Packaging which affords desired protection against moisture, light, and dirt is readily procurable on any market and should offer no obstacles. Cereals of this type are deleteriously affected by exposure to high temperatures and humidity. They should be stored in cool, dry, well-ventilated storage where direct rays of the sun cannot fall on them. Under normal temperature and humidity conditions ready-to-eat cereals may be stored safely from 60 to 90 days.

b. *Mixes*.—(1) *General*.—Prepared mixes invariably contain some shortening and leavening ingredients. In unfinished form they should not possess offensive or uncharacteristic odors. On sieving a prepared mix if small pellet-like bodies are observed, they indicate an old product in which the leavening agent has been affected injuriously by being withdrawn from mechanical incorporation with the other ingredients. Such mixes will not produce a good product. The final and conclusive test of acceptability is baking. The resulting product should possess characteristic odor and flavor, good volume without excessive shortness or tendency to crumble when cut, and should keep well under normal circumstances.

(2) *Storage*.—All prepared mixes, both bread and pastry, are adversely affected by light and high temperatures. They also are highly susceptible to insect infestation and development of off-odors or rancidity. Storage should be dry and at temperatures not in excess of 70° F.

(3) *Inspection*.—(a) *Buckwheat pancake flour*.—A good product is slightly dark in color and has an even distribution of small dark specks of buckwheat flour. Pale-colored flours are deficient, dark-colored are excessive in buckwheat flour content. Granulation should be uniform with very slight graininess. A mixture of equal quantities of water and the flour should result in a fairly thick batter which does not stick to a properly heated griddle. The cooked cakes should possess characteristic buckwheat flavor devoid of stale, flat, greasy, raw,

burnt, medicinal, or other foreign flavor or odor, and should be light, even-grained, and tender. Crust color should be a live, even brown uniformly distributed over the surface.

(b) Inspection factors for other pancake or waffle mixtures are identical to those of buckwheat mixtures except for color.

54. Alimentary pastes.—*a. Types.*—Alimentary pastes are products prepared from semolina or durum wheat, from wheat farina, from flour, or a combination of any two or all three. In general, they are of two types, those with not less than 5.5 percent in weight upon a moisture-free basis of egg and/or egg yolk solids, and those with less than 5.5 percent on a moisture-free basis of egg and/or egg yolk solids. The first is the egg noodle type, while the other makes up the large field of macaronis, spaghetitis, vermicelli, elbows, shells, alphabets, etc.

Higher grade products are manufactured wholly from semolina and, except in the instance of some foreign-made pastes, are differentiated readily from the lower grade pastes made from wheat farina. Use of artificial coloring either in the mixture as a coating or as a stain is considered adulteration when any inferiority is concealed. When there is such concealment of inferiority, the mere statement of artificial coloring having been used does not operate in favor of the product.

b. Inspection.—(1) *Egg noodles.*—Should be free of dark, brown, dull, gray, or pale colors. There should be no cracking (checking) and a minimum of small broken pieces. Streaking or presence of dirt is not permissible. On breaking the fracture should be a clean, straight break. They should be a rich, bright yellow color.

The cooked product should possess a fresh, rich taste devoid of flat, doughy, stale, or rancid flavors. In texture it should retain original shape but in addition must be light, tender, and flexible without undue tensility, should retain its light creamy yellow color, and should swell or puff slightly. Disintegration is a mark of inferiority.

(2) *Macaroni and spaghetti.*—Macaroni which is tubular in shape has a seam along the side. In high quality product this seam seldom splits open at the ends. However, spaghetti which is a solid cylinder does not permit inspection in this respect. A good grade macaroni or spaghetti has a creamy cast speckled with small opaque granules which oftentimes, when on the surface, appear as short, glossy white, or brilliant teardrop-shaped streaks. A product made of flour or farina or a combination of the two is usually a dull, dirty white or gray or may tend to a light brown shade. Because of high tensility of the gluten, a paste made of semolina will permit manufacturing a longer rod or tube than is possible when using flour or farina. Good spaghetti or macaroni is quite hardy and will not break under slight

stress. Ordinarily but not necessarily a good quality product will bend considerably before breaking and when it does break it parts with a snap. If grasped at both ends of the rod and bent it will usually break into three or more pieces. Ordinarily the specification requirement of "approximately 11 inches in length" should not be modified since acceptance of shorter lengths of macaroni invites substitution of lower grade goods. Surface of breaks on a good product are clear and glossy. Poor macaroni will break with an uneven, ragged surface on each piece. Checking or cracking apparent on the surface of the raw product indicates poor drying and it will break or splinter at these points when cooked. After cooking, if the product presents an extremely roughened surface it is not acceptable. Flattening after cooking indicates poor quality.

Use of soybean flour will usually produce a reddish shade of color. A product containing soybean flour is not acceptable.

Upon holding a piece of spaghetti or macaroni up to the light, if no specks are visible it is proof that flour has been used; if artificially colored, immersion in water will discolor the water. Alcohol is a better color extractive.

The best test for macaroni or spaghetti is cooking. After being cooked in salty, boiling water until tender (about 25 minutes), it should maintain original form, should swell up to twice original size, and should absorb approximately three times its weight of water without becoming pasty or sticky.

c. Storage.—Except egg noodles, alimentary pastes will keep for at least 2 years if stored under ideal conditions. Egg noodles under proper conditions should keep well for about 6 months. Both types should be kept in dry storage free of odors. High temperatures (90° F. or above) over sustained storage may result in cracking. These products are subject to mustiness in damp storage and are highly subject to insect infestation or attack, particularly by weevils.

55. Crackers.—Inspection of crackers is made best by personnel having some knowledge of methods generally employed in their manufacture. The most common factors employed in inspection of this product are organoleptic. However, goods which, because of certain physical attributes outlined below, are suspected of low shortening or high moisture content can be proved of inferior quality in these two respects only by laboratory procedure.

a. Soda and oyster crackers, salted and unsalted.—(1) *Aroma.*—Goods of this variety are particularly susceptible to odors of fruits, spices, and improper packaging materials. Immediately on opening a container note should be made of any foreign odor not character-

istic of prime goods. Off-odors are objectionable and should not be passed on assumption that ventilation will remedy the defect. Crackers made from low-quality shortening, either vegetable or animal, will eventually develop off-odors which in many instances are associated with fat break-down or rancidity.

(2) *Shortening*.—Crackers having insufficient shortening tend to be tough and brittle. Increasing shortening content lowers shelf life in direct proportion to amount used. When crushed in the hand crackers should disintegrate in well-defined flakes not of sufficient flintiness to stick into and permit suspension from the hand when it is inverted. When broken across the grain broken edges should reveal a well-developed webbing or loose, open texture. There should be little, if any, close-grained, compact bony areas visible. Failure of docker holes to penetrate visibly through the cracker is often indication of high moisture content, particularly when goods are not hard or brittle.

(3) *Appearance*.—Pale appearance may indicate—

(a) Moisture reduction by a drying out process rather than proper baking, or

(b) Acid or raw tasting product.

Some bakeries attempt to conceal this acid condition by addition of corn sugars (dextrose) which will help realize a pleasing, golden brown upper surface or "bloom." When an appreciable percentage of goods is found misshapen, improperly developed, streaked, dirty, burned, or otherwise unappetizing in appearance, such finding is cause for rejection. Particular attention should be paid the bottom side of the cracker. On this side ordinarily will be found indication of insanitary production and handling or improper baking.

(4) *Taste*.—Upon tasting a cracker, the piece tasted should be held in the mouth sufficiently long (about 2 minutes) to permit development of a soapy or soda taste if such can be detected. Such taste is evidence of excess soda content. In this respect a large number of cracker manufacturers fail to produce a product meeting specification requirements. In instances where determination of hydrogen ion concentration (pH) can be made, a cracker falling within the bracket (7.2-8.6) usually will be acceptable as to soda content. As the pH drops below 7.2 acidity is accentuated while above 8.6 the characteristic bitter taste of soda becomes so pronounced as to be highly undesirable.

(5) *Container*.—While packaging requirements specify commercial packaging, it is not to be assumed that any and every container is acceptable. Good commercial usage requires that there be some

wrapper or liner which will protect goods from the carton board. Carton board is made largely from reclaimed waste paper and when of low quality may impart objectionable odors and/or flavors to contained goods. A carton made of new materials and not having any inside liner may not offer required protection to contents against carton board flavors or odors.

b. Sweet crackers.—(1) *Graham.*—Graham crackers should not be cloyingly sweet but may have flavor reminiscent of honey. Broken surface should reveal open texture without glossy or brittle appearance. On breaking, the piece should break into well-defined pieces and should not crumble apart. Extreme shortness, toughness, marked resistance to breaking, or a tendency toward bending are not permissible.

(2) *Raisin.*—Raisin-filled crackers must have been mixed in dough state to extent that raisins are incorporated within the dough. Spreading of raisins as a filler between two cracker surfaces is not acceptable.

c. Cookies.—Cookies, both plain and filled, represent a field of bakery goods in which low quality ingredients are disguised most easily. Like all bakery products margin of profit on high-grade goods is small and therefore any appreciable spread in price on any particular type can and probably will be reflected noticeably in goods produced. Flavored goods such as ginger snaps, vanilla wafers, etc. where characteristic taste is developed by use of strong flavoring agents are well-adapted to use of inferior ingredients disguised by acrid or pungent flavoring agents.

(1) *Ginger snaps.*—Ginger snaps should possess characteristic ginger flavor but should not be excessively pungent. They are in some instances byproduct cookies, that is, they may be partially composed of stale, scrap, or otherwise damaged materials reground and compounded with new materials. Snaps made in this manner usually have particles of reused material such as pieces of nut meats, spots of jam-like material, fig seeds, etc. A cookie giving evidence of such materials is not acceptable. The word "snap" implies that the cookie should break briskly with an audible snap but should not bend and tear apart. Apparent brittleness producing a snap is not to be construed as meaning that this product is naturally flinty or tough. Broken surface should reveal a close, even-grained product of uniform color and devoid of dark centers. Burned, misshapen, spotted, or streaked stock is not acceptable. Aroma should be characteristically and pleasingly gingerish. A harsh ginger odor may denote use of inferior ginger and possibly concealed inferiority of other

ingredients. Color should be developed evenly and may tend to shade from medium to dark brown.

(2) *Vanilla wafers*.—Vanilla wafers should possess characteristic, smooth, pleasing vanilla flavor and odor, and should be tender (short) without excessive crumbling. Presence of snap as in ginger snaps is characteristic of deficient shortening while goods which will permit any considerable bending without breaking are usually tough. Color should be an even, golden brown.

(3) *Fig bars*.—Fig bars may be adulterated. However, cheapening of the product will occur most generally by using a cheap grade of fig with an inferior dough covering. The baked cookie covering should have flavor characteristic of a tender, cake-like product and should not be entirely dependent on filling for flavor.

d. Storage.—All sweet crackers and cookies are subject to infestation and moisture damage. Storage should be in dry and ventilated buildings. Temperatures in excess of 85° F. are to be avoided when possible. Storage should not exceed 6 weeks.

SECTION VII

BEVERAGES

	Paragraph
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56. Coffee.—*a. Species*.—There are 80 or more species of coffee, though only 3 are of commercial importance, Arabica, Liberian, and Robusta. By far the major portion of commerce coffee is of the Arabica species. This species possesses the singular property of producing a bean of different size, color, and flavor peculiar to the locality where grown. Brazil, Colombia, Venezuela, and Mexico each produce many distinctly different coffees of the Arabica species.

(1) *Arabica* produces an almost infinite number of varieties ranging from the finest coffees in the world to some of the least desirable. Change in climate, altitude, or soil usually works a complete change in appearance, quality, and character, thereby producing a new variety. Arabica varies in size, shape, and color from a small, round, flinty, silvered, grayish-tan to an extra large, elongated, flat, waxy, bluish-green bean. In quality and character it ranges from very poor to very fine.

(2) *Liberian* usually runs true to form in appearance, quality, and character. Beans are medium to large elongated, with the central groove rolled in somewhat resembling a Parker House roll.

In quality and character it is strong and harsh. To one accustomed to a soft or mild coffee, the aroma is decidedly harsh and somewhat reminiscent of the odor of scorched leather.

(3) *Robusta* is more subject to variations than Liberian but much less so than Arabica. Beans are small to medium in size, short, and round, with an occasional flat, elongated bean. Color is gray to grayish-tan. In quality and character it varies from strong and harsh to almost neutral.

(4) *Specifications*.—Regulations and Federal specifications require that coffee for the Army will be equal to or better than Santos No. 4, and will be free from Rio or other objectionable flavors. Santos is a variety of the Arabica, while Rio is a variety of the Maragogipe. Quality and character of Rio coffee are harsh and pungent with a distinctive flavor that has been described as sweetish-sourish-bitter. Aroma is very pronounced in the brew after cooling.

(5) *Type or class*.—Because of vagueness and lack of uniformity, the New York Coffee Exchange has adopted a definite set of standards for types or classes, and a system of grading which is recognized by Federal and State Governments.

(a) *Factors*.—The term “a coffee” refers to a type or class. Factors that fix type or class of any coffee are—

1. Species
2. Subspecies or variety.
3. Quality.
4. Character.

(b) *Determination method*.—These factors are determined by—

1. Species, appearance.
2. Subspecies or variety, appearance and cup test.
3. Quality, appearance and cup test.
4. Character, cup test.

b. *Grading*.—(1) *Grade definition and designation*.—Grade is a measure of quality agreeing with an established standard or varying therefrom according to a fixed scale of differences. Grades are given numerical designations from 1 to 8. The numerical grade of a lot is only a factor fixing its value for trading purposes.

(2) *Method*.—Grading is quite simple as it is purely mechanical; once distinguishing the various coffee imperfections is learned nothing more is needed except good judgment.

(a) *Imperfection calculation*.—Imperfection is everything in the coffee which is not a normal, well-formed coffee bean. For counting imperfections the black bean has been taken as the basic unit,

and all other imperfections no matter what they may be are calculated in terms of black beans according to the following scale:

Imperfection	Number	Black bean equivalent
Shells or empty pods.....	2.....	1
Broken beans.....	5.....	1
Scorched beans.....	2.....	1
Soft or badly milled beans.....	2.....	1
Small stones.....	2 or 3.....	1
Large stone.....	1.....	1
Large husk.....	1.....	1
Small husks.....	2 or 3.....	1
Pod.....	1.....	1
Large pod.....	1.....	2

(b) *Mechanics*.—The simple mechanics consist of weighing out 1 pound of beans, spreading them thinly on a table, then picking out everything that is not a normal, well-formed bean. Imperfections thus removed are separated, counted, and converted into black beans according to the scale above. The number of imperfections per pound that determine numerical grades are as follows:

Imperfections:	Grade number
None.....	1
6.....	2
13.....	3
28-30.....	4
55-60.....	5
115-120.....	6
200.....	7
450.....	8

c. *Quality and character*.—While type and numerical grade of a coffee are factors in fixing its value for trading on the New York Coffee Exchange, these classifications do not indicate definitely its suitability for any other purpose. For instance, a coffee may be a Santos and grade No. 4, but that does not mean that it is acceptable as Grade A under the Federal specification. In determining suitability of a coffee for any specific use, *quality* and *character* are the all-important factors; type and numerical grade then merely indicate quality and character to be expected.

(1) *Quality*.—There are two kinds of quality, roasting and cup.

(a) *Roasting*.—Roasting quality means the kind of roast the coffee will produce. Coffee has good roasting quality when the beans will roast to a uniform color without breaking or splitting, when increase

in size is even, and when surface of the beans is bright and pleasing to the eye. Roasting quality is described as—

1. Handsome.
2. Excellent.
3. Fine.
4. Good.
5. Fair.
6. Rough.
7. Poor.

(b) *Cup*.—Cup quality is the combination of sensations that the brew will produce through taste buds of the tongue and the olfactory nerves located in the upper respiratory passages. It is the combined flavor and aroma when sensed simultaneously. The multiplicity of terms used in describing cup quality, both desirable and undesirable, are quite confusing to the novice and to attempt a written description of the sensations these terms signify would be as hopeless a task as trying to describe color to a person born blind. Applying them correctly can be learned only by experience but when once learned they are as definite and as easily identified as the distinctive flavor and aroma of a ripe peach. Desirable cup quality is termed—

Rich.	Heavy body.
Excellent.	Good body.
Fine.	Mellow.
Smooth.	Good.

Undesirable cup quality takes many forms that result from a variety of causes such as type or variety, climate, soil, method of cultivation, harvesting, curing, and handling. Terms denoting undesirable cup quality include—

Rank.	Bitter.
Hiddy.	Medicated.
Sour.	Woody.
Winy.	Groundy.
Harsh.	Grassy.
Rioy or rio flavor.	Flat.
Muddy.	Musty.

(2) *Character*.—Character in coffee is the flavor of the brew as determined by the sense of taste alone. Character is described as acid, bitter, sweet, and neutral.

Human taste buds are sensitive to only four flavors, sweet, acid, bitter, and salt. In coffee the first three only are applicable.

(a) *Acid*.—Acid is not, as the term would indicate, undesirable but is highly desirable, though some coffees are too acid to make a satisfactory brew unless blended with one of less acidity. Acidity is best described as a pleasing astringency. Descriptive terms generally used to express degree are high, mild, low, and nonacid.

(b) *Bitter*.—All coffees possess bitterness to a certain degree and a limited amount is desirable. It is only when this characteristic is so pronounced as to be objectionable that the coffee is termed "bitter."

(c) *Neutral*.—Coffee is neutral when it is neither acid, bitter, or sweet to any noticeable degree.

(3) *Thin*.—The term "thin" is often applied to coffee lacking in both quality and character. A thin coffee is best described as one that is entirely neutral in character and without any pronounced aroma. One authority describes a thin coffee as one that lacks everything.

d. *Testing*.—The first step in testing is to compare appearance of the green bean of the sample being tested with a sample of known standard value for that particular kind of coffee. The next step is to compare appearance when roasted, then appearance and aroma test when it is ground, and finally the most difficult, trial of flavor and aroma of the liquid. Great care must be given to roasting samples to be examined. Each sample should have the same degree of roast at the same temperature.

(1) *Roasting*.—Roasting is carried out at different temperatures ranging from 385° to 500° F. During roasting there is a large loss in water and crude fiber due to the process of destructive distillation which takes place. Loss in fatty substances, ash, and caffeine is quite small. It is well to remember that while weight decreases during roasting, volume increases from 25 to 70 percent, depending upon degree to which roasting process is carried. When proper roasting point is reached, beans are smelled while still hot, to determine aroma. In some grades it is necessary to smell them frequently as they cool, because aroma changes as temperature drops.

(2) *Cup*.—After roasting and grinding, the actual cup test begins. Two methods are employed, the blind cup test in which there is no clue to identity of the kind being tested, and the open test in which the tester knows beforehand particular coffee being tested. The former is the method most generally employed. In both methods amount of ground coffee placed in the cup is weighed carefully (5 grams to an ordinary teacup) so that strength will be standard. Use freshly boiled water. In pouring water exercise care to keep

temperature constant in all cups so that strength of all will be equal. This is best accomplished by pouring water from a large kettle holding four or five times amount of water required to fill all the cups. When the water is poured directly on the grounds a crust or scum is formed, and before this crust breaks the tester sniffs the aroma. This is called the wet smell or crust test and is of great importance. The final step, tasting the brew, is the most important. Before actually testing the brew, the tester stirs each cup with a spoon and notes aroma. After this stirring all floating grounds are skimmed off and a spoonful of the brew is sipped and held in the mouth only long enough for the tester to get the full flavor. The tester never swallows the brew, merely rolling it around in the mouth and to the base of the tongue and then spitting it out. When the brew is first sipped the mouth is closed and held closed a few seconds, in this way judging character. The mouth is then opened slightly and some air inhaled through both nostrils and mouth. The tester thus senses flavor and aroma simultaneously and judges quality. After spitting out the brew, the mouth is held closed for a few seconds and lingering flavor sensed. Some testers find it helpful to have a glass of cold water and a lighted cigarette handy, and after tasting each sample, rinse the mouth with water and take a few puffs on a cigarette to remove all flavor and aroma before trying the next sample. During testing to determine suitability of coffees for any particular purpose, a control cup brewed from a sample of known suitable quality and character is kept at hand for comparison with the sample being tested. This procedure is always followed in testing bidders' sample for Army purchases.

e. Adulteration.—The Pure Food law requires labeling of coffee compounds to show what the compound contains, and as long as prices are within reason, use of adulterants is not profitable. Therefore, adulterated coffee is not apt to be found in legitimate trade channels. Exceptionally high prices might encourage unscrupulous dealers to mix cereals, peas, beans, chicory, etc., with roasted or roasted and ground coffee, but detection of such adulterants is quite simple. Careful inspection of unground coffee will detect imperfect, split, and defective beans. If these have a hard and polished surface they are probably peas or other legumes. If they can be crushed to a powder between the fingers they are apt to be balls of chicory. Use of a reading glass will aid in detection of adulterants. To detect artificial coloring cut through a bean with a sharp knife. If the color is localized on the surface and not uniform throughout the cross section, the bean has been artificially colored or artificially

aged. To test roasted and ground coffee for adulterants, place a spoonful on the surface of a glass of clear water; most of the coffee grounds will float. Chicory will sink and stain the water a brownish-red. The coffee bean contains no starch while nearly every adulterating substance does; therefore the iodine starch test is valuable. Stir a spoonful of the sample into a glass of water and then add a few drops of iodine. If starch is present the water will turn blue.

f. Storage.—If properly stored, green coffee will improve with age up to about 5 years. After that time it tends to become woody and flavorless, degree of deterioration depending upon climatic conditions. High relative humidity and high temperatures hasten deterioration. Bags in which green coffee is stored should be loosely filled. Should unforeseen circumstances cause absorption of moisture, beans will increase in size and cause tightly filled bags to burst. Prime requisites for good coffee storage are—

- (1) Dryness.
- (2) Good ventilation.
- (3) Absence of contaminating odors such as paints, oils, soap, tobacco, spices, fruits, vegetables, and insecticides.
- (4) Stacking on dunnage at least 4 inches high. Stack so that at least one side of each sack will be exposed.

There will be some shrinkage in green coffee in storage. Under proper storage conditions this will be about 2 percent at the end of 1 year and about 4 percent at the end of 3 or 4 years. Roasted coffee is a highly perishable article and should be used as soon as possible after roasting. Roasted and ground coffee should be used within 8 days. Roasted unground coffee should be used within 15 days.

57. Tea.—*a. Types and grades.*—Like coffee, there is a large variety in kinds and grades of tea. However, all commerce teas fall within one of three general classes or types, Black, Green, and Oolong. Each of the three main classifications is subdivided into grades depending upon leaf position on the twig, districts in which produced, quality, time of harvesting, etc.

- (1) Black tea leaf grades from highest to lowest are—
 - (a) Flowery Orange Pekoe.
 - (b) Orange Pekoe.
 - (c) Pekoe.
 - (d) Pekoe Souchong.
 - (e) Souchong.

Separation into various grades results from the three types of plucking employed in harvesting tea and hand-sorting and mechanical sieving during manufacturing process. A “fine plucking” includes

only the tip and one or two partly matured leaves, and from this plucking Flowery Orange Pekoe and some Orange Pekoe are obtained. A "medium plucking" includes the first and second matured leaves and from this plucking some Orange Pekoe and the Pekoe are obtained. A "coarse plucking" includes the remaining leaves and this plucking is separated into Pekoe Souchong and Souchong grades.

(2) The principal China green tea grades or styles with the corresponding black grades are—

Green grades:

Gun powder.....	<i>Black grades</i>
Imperial.....	Flowery Orange Pekoe.
Young Hyson.....	Orange Pekoe.
Hyson.....	Pekoe.
Hyson Skin or Twankay.....	Pekoe Souchong.
	Souchong.

b. Grade characteristics.—Following is a general description of characteristics to be expected of the various grades:

(1) *Gunpowder.*—Young leaves small to medium in size, rolled into tight balls running from the size of a pinhead to that of a pea.

(2) *Imperial.*—Generally consists of older and coarser leaves. Rolled like gunpowder, but considerably looser.

(3) *Young Hyson.*—Prepared from medium leaves about number three on the shoot, tightly rolled and twisted so as to appear like short pieces of wire.

(4) *Hyson.*—Prepared from older and coarser leaves of each picking. Leaves are loosely twisted lengthwise and this style bears the same relation to Young Hyson as Imperial does to Gunpowder.

(5) *Hyson Skin or Twankay.*—Comprises the oldest and coarsest leaves on each shoot from all pickings that cannot be converted into other styles. Leaves are large, loose, and flat, and vary in color.

c. Testing.—In testing, appearance, feel, and odor of dry leaves will give a fairly clear idea of quality that can be expected. Each tea has a certain characteristic flavor, color, aroma, and appearance. It is not difficult to learn these characteristics and place a tea in one of the general classes. An inspector should not be influenced by appearance alone because some of the rough looking teas have the finest flavors.

(a) *Black.*—Black teas should be dry and of a uniform color. The leaf as a rule should be thin and tightly rolled. Presence of gray tips adds to quality; sticks, stems, stalks, etc., detract from value and teas containing them are objectionable. A considerable amount of stalks may be expected in cheap teas; this is nothing but wood fiber and is quite evident on infusion.

(b) *Green*.—Green teas should be dry and a uniform gray color. No matter what happens to the style, a tightly rolled leaf is generally an indication of young leaves. The finest teas are prepared from the youngest leaves and these are susceptible to being tightly rolled. Large, rough, loosely rolled leaves as a rule do not produce pleasing beverages.

Pick up a handful of leaves; they should be dry and crisp and resist breaking when gentle pressure is applied. Moist or damp tea if not already sour will soon become so.

Breathe upon a sample of dry tea and quickly inhale aroma. It should be sweet, fresh, and free from obnoxious or foreign odors.

(c) *Cup method*.—Weigh out exactly 3 grams (use a dime on a pair of small balance scales), place in an ordinary cup and cover with water which has boiled vigorously for a few minutes. After 3 minutes pour liquor off into a second cup and hold leaves in the first cup with the aid of a spoon or a piece of wire cloth. Aroma from the hot liquor and from the leaves should be fresh, sweet, and characteristic of the kind being tested. Avoid teas with sour, musty, and foreign odors. Take a teaspoonful of the brew and draw it back upon the palate; after a few seconds spit it out without swallowing any. Flavor should be pleasing and characteristic. Determination of quality among teas of the same variety is made by comparison at infusion, and care should be taken to weigh exact amounts and infuse for exactly the same period of time. A very dark to black liquor is an indication of poor quality.

d. *Individual characteristics*.—The following indicates individual characteristics after infusion of some of the better known teas:

(1) *India*.—Liquor is dark brown with pungent aroma and astringent flavor. Leaves should be a bright copper color.

(2) *Ceylon*.—Liquor varies from ruby red to mahogany in color. The bland oil of lemon aroma and flavor are easily detected. Leaves are copper colored but have a greenish cast.

(3) *Congou*.—Liquor is a reddish brown in color and generally has a toasty flavor. Leaves are inclined to be a dirty black color.

(4) *Japan*.—Liquor is very pale green in color. Some of the finer teas have an aroma like new hay, but all of them are distinguished by the metallic taste. To one unaccustomed to these teas, flavor and aroma are reminiscent of the fishy atmosphere of salt marsh lands. Leaves become nearly natural in shape and color.

(5) *China green*.—Liquor runs from a yellow to brownish yellow in color. Aroma and flavor vary with grade and quality. Leaves

assume appearance of green leaves, the poor grades showing some black- or brown-edged.

(6) *Formosa Oolong*.—Liquor varies from amber to brown in color. Flavor is delicate and aroma very fragrant; both are characteristic. Leaves indicate poor fermenting and poor quality.

(7) *Java and Sumatra*.—They are all similar to India teas in growth, manufacture, and characteristics.

e. Adulteration.—Tea on the American market is no longer adulterated with spent leaves or colored with Prussian blue or indigo because the Federal Government holds all teas in bond until their quality and purity are determined. Those which fail to come up to the standards selected each year are denied entry to the United States. While the Government guarantees purity, when it comes to quality the buyer must take care. Teas which conform to minimum requirements for entry into this country are neither suitable for the soldier nor for the average consumer.

f. Storage.—Storage is a simple matter under conditions usually found at posts, camps, and stations. If the following precautions are observed no difficulties will be encountered.

(1) Protect from contaminating odors such as tobacco, oils, paints, onions, vinegar, etc.

(2) Avoid dampness. Humidity in excess of 80 percent will cause mustiness and souring.

(3) Avoid rough handling as this will break leaves and produce dust.

(4) Protect from high temperatures. Excessive heat drives off essential oils and leaves tea flat and lacking in natural flavor.

(5) Containers should be kept tightly closed until ready for use. When tea is to be issued or sold in smaller quantities than the original chests or cans, these should be emptied into a can or bin having a tight-fitting lid and issues or sales made therefrom.

58. Cocoa.—*a. Inspection*.—It is believed that the Federal specification for cocoa adequately describes characteristics necessary to secure desired material. However, cocoa of the "Breakfast Cocoa" type only is permissible for Army use. The "German" or "Dutch" types, usually easily distinguished by their darker color, may not be purchased for Army use. Inspection should include—

(1) *Color*.—Should be of a rich deep medium brown. Light brown cocoas are usually "stuffed" with sugar, malt, starch, etc. Dark brown cocoa is usually "Dutched," that is, alkaline treated before or during roasting process.

(2) *Texture*.—Grittiness or graininess indicates poor or incomplete manufacturing processes or adulteration. Grittiness is not permissible.

(3) *Flavor*.—Flavor should be characteristic of unsweetened or otherwise artificially flavored cocoa.

(4) *Lumping*.—Lumping to extent of rendering product difficult to use is not permissible.

b. Storage.—Protect from—

(1) Heat. Temperatures above 75° F. should be avoided.

(2) Light. Light tends to hasten development of rancidity and produces dullness of color.

(3) Moisture. Dampness will cause lumpiness and molding.

(4) Insects. Cocoa is subject to attack by insects that attack food in general. If once infested to any appreciable extent the product is ruined.

SECTION VIII

PICKLES, RELISHES, OLIVES, AND SAUCES

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59. Pickles and relishes.—*a. Sour and sweet pickles.*—Sour and sweet pickles are made from salt stock. In sour pickles salt is reduced by diffusion with vinegar to approximately 5 percent and in sweet pickles (made from sour) to about 2 percent or 3 percent by diffusion with sugar liquor. Salt stock is the clean, sound, immature cucumber preserved in a solution of common salt.

(1) *Dill*.—(*a*) *Imitation*.—Imitation dills are also made from salt stock and in consequence can be placed on the market at any time of the year.

(*b*) *Genuine*.—The genuine dill is made from fresh stock by lactic fermentation in a weak brine and therefore lacks the keeping qualities of regular salt stock.

(2) *Mixed*.—Mixed pickles usually consist of cut cucumbers, cauliflowers, onions, and a few small red peppers. This product is packed either as sweet mixed or sour mixed with characteristics similar to sweet or sour pickles.

(3) *Chow-chow*.—Chow-chow pickles are prepared from small cucumbers, cut cucumbers, onions, cauliflower, and occasionally a few tobasco peppers. The ingredients are processed in brine, made sour, covered with chow dressing, and packed in bottles. Chow dressing may be either sweet or sour.

b. Relish, sweet.—Sweet relish is made from finely divided cucumbers, cauliflower, green tomatoes, and onions. The ingredients are

processed in brine, made sour, and preserved in sweet liquor made from vinegar and sugar.

c. Inspection.—Care should be exercised that no larger pickle is delivered than the specification size. Individual pickles should be uniform in shape, almost cylindrical with rounded ends, fairly smooth, fairly uniform in color, that is, a bright green. Sweets are darker green than sours. Pickles should be firm, not slippery, and break with a snap. They should be free from hollow or spongy centers. On splitting the cucumber from end to end color should be uniform throughout and there should be no gas pockets.

Containers should be tight and not leaking.

d. Storage.—Sour pickles in kegs will tend to become soft in 3 or 4 months. In cans they will keep 6 to 8 months. Sweet pickles will keep somewhat longer. Genuine dills are poor keepers. Pickles packed in glass should be kept out of the light.

Pickles should be protected from freezing. Kegs should be treated the same as for vinegar to prevent leaks.

60. Olives. — *a. Green.* — (1) *General.* — Practically all green olives sold in the United States come from Spain. Two varieties are employed in making green olives, the Queen (Sevillana or Gordal) and the Manzanilla. The flesh of the Manzanilla is tender, the skin can be made to feather off, and the fruit is comparatively easy to pit. The Queen is darker green, larger, pointed instead of rounded, flesh is coarser, more fibrous, brittle, and the pit is difficult to separate from the flesh. For fancy glass-packed fruits, jars are packed by means of a long slender stick called "stick pack" or "placed." "Loose pack" consists of merely dropping olives into the jar and tapping it lightly to settle.

(2) *Inspection.*—(a) Care should be exercised that olives are size specified.

(b) A white deposit showing indicates fermentation was not complete during pickling. Olives so affected are not injured but should not be purchased as consumer will refuse to accept them.

(c) A bacterial decomposition known as zapateria is indicated by an offensive odor.

(d) Scum on top of liquid indicates slack filling or minute leaks.

(3) *Storage.*—Green olives should keep for 1 year in dark, cool storage. In too warm storage fermentation may set in and sufficient gas developed to force the lid. The brine also has a corrosive effect on the lid causing pinholes or rusting of edges where they come in contact with the brine.

b. Stuffed (pimiento).—(1) *General.*—Usually Manzanillas are employed, although occasionally Queen olives are stuffed. Small strips of pimiento are folded and stuffed into the olive by hand. The olives are then placed in brine and left in the sun until the pimientos are cured.

(2) *Inspection.*—Same as for green olives. Pimiento should be a bright red and liquid practically free from small bits of pimiento.

(3) *Storage.*—Same as for green olives.

c. Ripe.—(1) *Inspection.*—Should be uniform in color, size, and free from marked, bruised, or damaged fruit. Dark color should be localized near skin and flesh should be light colored and tender but not soft. Flavor should be rich and not “scorched,” free from bitterness. Varieties that separate readily from pit are more desirable.

(2) *Storage.*—Cool. Frequent inspections should be made for pinholes and rust.

61. Sauces.—*a. Worcestershire.*—(1) *General.*—Worcestershire sauces are prepared from a base of vinegar and soy sauce. The soy sauce when first mixed with the spices produces a harsh, disagreeable flavor that disappears by aging in hardwood barrels. This harshness can be overcome to a certain extent by long cooking, but best sauces are made by a short cook and long aging.

(2) *Inspection.*—Should be compared for flavor with a known acceptable sample. Should be free from harsh flavor of raw soy sauce. Containers should be well sealed.

(3) *Storage.*—Will keep in ordinary storage for 1 year.

b. Mustard (prepared).—(1) *General.*—Two varieties of mustard seed used are yellow or white, and black or brown. The blend will vary according to the ideas of the manufacturer.

(a) *English* is made from yellow seed mixed with garlic, vinegar, and black pepper.

(b) *German* is prepared from brown seed mixed with vinegar and salt.

(c) *French* is prepared from yellow seed and mixed with spices and vinegar, with or without salt.

(2) *Inspection.*—When mustard flour is used in manufacture of prepared mustard, mustard bran or cornstarch and turmeric are added as a filler. Turmeric is added to give color to cover other defects.

Prepared mustard should have a smooth, heavy body with very little free liquid at top of container. Seeds should have an even and uniform grind, and be free from fiber. Black and white specks indicate an uneven grind or poor quality seeds.

(3) *Storage*.—Store in a dark, cool place. Light will bleach color. Warm temperatures will separate ingredients and cause loss of strength.

c. Tomato.—(1) *General*.—In manufacture of tomato catsup, tomatoes are washed, trimmed, and then sent to a pulper which consists of a stationary cylinder screen with holes small enough to prevent any seeds and skin from passing. In manufacture of chili sauce tomatoes are handled in a similar way except that pulpers have screens large enough to allow seed to pass through. The best catsups and chili sauces are made from raw pulp of whole tomatoes and in one cooking.

(2) *Inspection*.—Specific gravity of tomato catsup varies from 1.085 for poor grade to 1.17 for a good product. Consistency should be heavy, smooth, and thick. It should show no sign of separating or clotting. A drop of tomato catsup placed on a piece of dry kraft paper will remain globular for several minutes before there is any appreciable absorption by the paper.

The specific gravity of chili sauce should be between 1.14 and 1.20.

Both catsup and chili sauce should have a natural red tomato color. Paleness or any suggestion of yellow indicates use of sun-scaud or green tomatoes. Dark red or brown color indicates overcooking or overprocessing. Paprika added to give color can be detected by spreading a thin layer on glass. The small particles of paprika can be seen by the naked eye. Black neck or darkening at the top of bottles is an indication of improper sealing and is cause for rejection.

Products should have a characteristic catsup or chili sauce flavor free from metallic, medicated, or musty flavors.

(3) *Storage*.—Bottled products should be stacked upside down and kept in cases or boxes to protect from light. Good catsup or chili sauce properly packed will keep for 1 year.

SECTION IX

SEASONING AGENTS

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62. Salt.—*a. General*.—Free-running salt for cartons is kept in its finely divided, dry state by use of dries which are usually mag-

nesium carbonate or calcium phosphate, only a fraction of 1 percent being needed.

Some state health authorities, especially in the so-called "goiter belt" of the middle west, request refiners to add iodine to all table salt packed in retail packages. Iodine is added in the form of sodium iodide or potassium iodide.

b. Inspection.—Table salt containing impurities may have an undesirable flavor, off color, or may cake badly.

A simple test for cleanliness may be made by dissolving 5 pounds of salt in 3 gallons of distilled, filtered water. Filter solution through a white filter disc. Any insoluble foreign matter will show on filter disc.

c. Storage.—Salt should be stored in a dry place to prevent the absorption of moisture. Salt bags or barrels should be stacked on dunnage to allow free circulation of air. Salt in moistureproof cartons and containing an agent to prevent caking will cake if exposed to moisture-laden air for 3 to 4 months.

63. Vinegar.—(1) *General.*—(a) *Cider.*—Cider vinegar is made by alcoholic and subsequent acetous fermentations of apple juice.

(b) *Distilled.*—Distilled vinegar is made by acetous fermentation of dilute distilled alcohol.

(c) *Malt.*—Malt vinegar is made by alcoholic and subsequent acetous fermentations without distillation of an infusion of barley malt or cereals whose starch has been converted by malt.

(2) *Inspection.*—Vinegar should be examined for the following parasites and defects:

(a) *Mother of vinegar* is a mass of adjoining cells swelled into a cohesive mucilaginous jelly. This formation is due to bacteria present in unsterilized vinegar.

(b) *Vinegar eel* is a long, slender, eel-like parasite infecting only vinegar or other mediums in which acetic acid is present. It is about $\frac{1}{25}$ inch in length tapering out to a thread-like tail. It is noticeable to the naked eye as a wriggling, threadlike organism, usually on or near surface of the liquid. Presence of vinegar eels indicates lack of sanitation in manufacture and lack of sterilization in bottling or barreling.

(c) *Vinegar mites* are minute pests not readily detected by the naked eye. In vinegar affected by mites their bodies may show up as fine white specks on the surface. Presence of these mites in quantity imparts a musty odor and flavor.

(3) *Storage.*—Where available, basement storage is the best since it is cool and moist. Containers should be protected from extreme

heat and direct rays of the sun. They should also be protected from freezing. Ideal temperature is between 40° and 50° F.

Kegs and barrels may be stored on end or on bilge. If stored on bilge, they should be placed with the bung up, but enough to one side to keep bung moist. If stored on end, water should be kept in chimes at all times. Each keg or barrel should be turned or reversed once every 3 weeks. Hoops should be kept tight at all times and painted with red lead to prevent rust. Vinegar flies are a storage pest. The fly is readily distinguished by its large red eyes, long glittering wings, and black and yellow-striped abdomen. It is very small and difficult to keep out. The best means of combating this fly are by cleanliness, light, and fine-mesh screens.

64. Spices.—*a. General.*—Spices depend upon their essential oils to impart their taste to foods. Essential oils waste away by evaporation at ordinary temperature. When they become thoroughly dried out and odorless they have lost ability to impart their taste to foods.

Grading spices is different in almost every case. The different grades are identified by places of origin or the port from which the spices are shipped.

b. Inspection.—Inspection consists of an examination for freshness and a comparison with a sample of known quality for color, quality, odor, and flavor. These samples should be changed every 3 months so that they will be fresh. Oily spices show caking or lumping with age. Certain spices are subject to mold if kept in damp places.

c. Storage.—Spices should be stored in a cool, dry place. Evaporation of the volatile oils and insect infestation are the principal causes for deterioration.

Three months is considered a feasible time for storing ground spices under proper storage conditions. Whole spices are better keepers and may be stored for a period of 6 months without loss of flavor.

65. Flavoring extracts.—*a. General.*—Flavoring extracts are derived from two sources, plants, known as “true extracts,” and chemical compounds that produce desired flavor and aroma or any source other than the plant for which the extract is named. Such flavors are called “synthetic” or imitation flavors.

(1) *Concentrated* are extracts in which proportion of menstruum is reduced. It may be either genuine or imitation.

(2) *Nonalcoholic* flavors are made by mixing either a true or synthetic flavor with various carrying agents as cottonseed oil, gums, etc.

(3) *Terpeneless* of lemon and orange is the flavoring extract from which all or nearly all of the terpenes have been removed.

b. Inspection.—Inspection is largely a matter of chemical analysis. There are times when circumstances will not permit sending a sample to the depot for analysis. Under these circumstances the most satisfactory method of making a test is by comparison with another sample of known strength and purity. The following tests are recommended for that purpose:

(1) *Vanilla.*—Make a 5-percent solution of unknown and the known samples by adding 6 teaspoonsful of flavor to a pint of water. All ingredients should be at room temperature. Taste samples and compare with flavor of known sample. None of the liquid should be swallowed and the mouth should be rinsed with fresh water after tasting each sample.

(2) *Lemon and orange.*—Comparison of aromatic strength of several samples may be made by placing a few drops of each upon clean pieces of white blotting paper and allowing them to stand a few minutes for the alcohol to evaporate. Careful smelling of the different samples will determine which has the strongest aroma. In this test the true extract will show a reddish-lavender ring around the edge and the inner surface of the ring will be comparatively smooth. A terpeneless extract will not produce any discoloration around the edge of the ring and the surface of the blotter inside the ring (drop) will appear roughened and raised.

If several drops of true lemon extract are dropped in a glass of cold water, they immediately produce a slight milky appearance in the water with a whitish vapor visible on the surface. An oily film will appear on the surface. Terpeneless extracts when dropped in cold water diffuse with little or no milkiness.

SECTION X

SWEET PRODUCTS

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66. Sirup and molasses.—Field inspection of sirup and molasses is confined to Baumé hydrometer readings for sugar content as provided in applicable specifications and to examination for characteristic taste and odor. Sharp acrid or bitter taste is accentuated when low-grade ingredients are used. Presence of excessive corn sirups in a blend can be detected ordinarily by drawing a knife or spoon through a shallow container to detect characteristic corn sirup rippling on the surface. Presence of foreign materials of any kind is not permissible. Molasses will vary from a golden brown color in better grades to black in lowest grades.

67. Honey.—Honey must be of characteristic odor and flavor of the kind it purports to represent. Color will be specified in bids (see F. S. C-H-571). In addition to detailed requirements under applicable specification, presence of comb or sugar crystals is not permissible. Sophistication in honey is confined to artificially prepared invert sugars, cane sugar, gelatin, molasses, and glucose. Honey adulterated with glucose containing copperas reacts to tea or any liquid containing tannin by turning an inky black. Adulteration of comb honey is rare. Adulteration of strained honey is not ordinarily readily determinable except by chemical analysis.

68. Candy.—*a. Hard.*—Should be well-flavored, free of excessive misshapen pieces, and should have a high, glossy finish.

b. Filled hard.—Should be well-flavored, have thin shells and soft centers. Thick shells and gummy centers indicate inferior goods.

c. Caramels.—Should have a definite flavor, smooth in texture, free of graininess indicating sugar crystallization, and not tough or hard.

d. Cream centers.—Coatings should be evenly applied and fairly thick. Centers of a bluish or grayish cast or that are soggy indicate poor quality. Centers should part when pulled apart and should not stretch as does gum. Candied cherry centers and centers having various wines as flavoring ingredients are somewhat susceptible to sogginess by their very nature.

e. Chocolate coated.—Chocolate used should be mild and pleasant to the taste. Dark coatings harsh and bitter to the taste when used on a candy not ordinarily bitter by intent are usually poor quality.

f. Milk chocolate coatings.—Should be definitely milky in taste but should not be too light in color. Milk coatings which are sugary are not high quality.

All chocolate coatings should be smooth and bland to the taste and should have a glossy appearance.

Candies which are streaked, faded, crushed, gummy, or mucilaginous to the touch are not acceptable. Hard candies should permit

extraction from containers in individual pieces and should not be stuck into a mass not permitting easy extraction.

69. Chocolate.—Chocolate which has been subjected to high temperatures is prone to “bloom”; that is, to undergo a separation of fat and nonfatty solids. The fat will rise to the top while other solids will sink to the bottom. Any such damage is cause for rejection. Chocolate evidencing a mottled or speckled appearance has been damaged by moisture absorption and should not be accepted.

Good quality chocolate is firm and smooth in texture and devoid of all grittiness or harsh foreign material. Inspection factors are identical for both plain and vanilla-flavored, sweetened chocolate except taste.

70. Jam.—Jams must possess characteristic good flavor and color. Common causes for rejection are poor consistency attendant in runny, “weepy,” or watery products, and toughness often due to overprocessing or addition of excess pectin in an effort to bolster up some deficiency known or suspected to exist in raw materials. Jams should be firm but should not offer marked resistance to penetration by a sharp edge. When poured from the can or jar there should be a slight “mounding” or piling up of the product which after some time will disappear. Jams should not be transparent as are jellies but should be translucent to a considerable degree. Presence of sugar crystallization is not permissible. Aroma should be pleasant and in no instance foreign to type being examined. Foreign material such as stems, peelings, cores, etc., are not permissible. Scorched products should not be accepted.

Preserves are, in effect, jams in which individual pieces of fruit meats are large or have not been reduced to a pulp.

71. Jelly.—Like jams, jellies must possess characteristic good flavor and color. Common causes for rejection are crystals. Jellies are susceptible to crystallization of fruit sugars more readily than jams and preserves. Presence of crystals is recognized readily by touch or by gritting between the teeth. Since jellies are made from fruit juices with possible addition of pectin, there should be no cloudiness or apparent foreign material. The product may be transparent to translucent. It should be of a gelatin-like consistency on removal from the container and should show no excess free liquid. When cut with a knife it should offer but slight resistance and should fall away from the cutting edge without evidence of stickiness or mucilaginous adherence. Toughness is not to be confused with firmness. Toughness is best recognized by tapping the side of

the mound or shaped mass with the flat of a knife. When the effect is that of a rubber-like resiliency the jelly is tough. Only extreme toughness is easily recognized when the product is eaten. A jelly of proper consistency will offer some resistance to spreading but is capable of being blended or smoothed over the cut surface of reasonably firm bread without undue effort.

72. Storage.—*a. Honey and sirup.*—Honey is subject to deterioration when exposed to light when packed in glass. All sirups, etc., except maple should be stored in moderate storage varying up to 75° F. These products are very stable when not exposed to light and keep well for at least 6 months. Maple sirup should be kept in cold storage when opened. When unopened, it is stable at ordinary storage temperatures.

b. Candy.—All candies are deleteriously affected by excessive light and prolonged temperatures above 75° F. A good storage temperature is about 50° F. without excessive humidity. All candies are subject to infestation and must be handled carefully to prevent undue damage. Chocolate candies stored at 50° to 55° F. should be raised in temperature slowly until a temperature of approximately 75° F. is reached. Abrupt rises in temperature usually result in condensation of moisture on surface of candies and a consequent spotting. Hard candies packed in glass will lose external gloss if exposed to sunlight, and are deleteriously affected in storage temperatures above 85° F. Candies having nut meats as an ingredient should be examined systematically for insect infestation. Candy centers containing cordials, for example, chocolate-coated cherries, cannot be stored safely for a period in excess of 45 days.

c. Chocolate.—Chocolate, a product which contains a large percentage of fat, is affected adversely by light as is cocoa. Deterioration is accelerated in storage permitting temperatures higher than 70° F. or by subjugation to light over any considerable period of time.

d. Jams and jellies.—All these products are deleteriously affected by exposure to light. Those containing seeds are particularly apt to develop hydrogen gas and have side seams of cans forced open. A shipment of jam in which the contents of one or several cans have contaminated other cans should be rejected. When burst cans contaminate stocks on hand, cans so damaged must be removed and all others on which leakage has occurred should be washed or otherwise thoroughly cleaned. Storage temperatures above 85° F. are to be avoided.

SECTION XI

MEAT AND MEAT PRODUCTS

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73. Definitions (United States Department of Agriculture).—*a. General.*—(1) *Flesh* is any edible part of the striated muscle of an animal. The term “animal” as used in this manual indicates a mammal, a fowl, a fish, a crustacean, a mollusk, or any other animal used as a source of food.

(2) *Meat* is the properly dressed flesh derived from cattle, swine, sheep, or goats sufficiently mature and in good health at time of slaughter, but is restricted to that part of the striated muscle which is skeletal or that which is found in the tongue, diaphragm, heart, or esophagus, and does not include that found in the lips, snout, or ears with or without accompanying and overlying fat, and the portions of bone, skin, sinew, nerve, and blood vessels which normally accompany flesh and which may not have been separated from it in process of dressing for sale. The term “meat” when used in qualified form as, for example, “horse meat,” “reindeer meat,” “crab meat,” etc., is then and then only properly applied to corresponding portions of animals other than cattle, swine, sheep, and goats.

(3) *Fresh meat* is meat which has undergone no substantial change in character since time of slaughter.

b. Meats.—(1) *Food animals.*—(a) *Beef.*—Cattle nearly 1 year of age or older.

(b) *Veal.*—Young cattle 1 year or less of age. (Minimum limits governing age or weight or both of veal and lamb have been fixed by certain States and municipalities in the case of calves and lambs to be slaughtered for meat.)

(c) *Mutton.*—Sheep nearly 1 year of age or older.

(d) *Lamb.*—Young sheep 1 year or less of age.

(e) *Pork.*—Swine.

(f) *Venison*.—Deer.

(2) *Byproducts* are any properly dressed edible parts other than meat which have been derived from one or more carcasses of cattle, swine, sheep, or goats sufficiently mature and in good health at time of slaughter.

(3) *Prepared meats*.—Prepared meat is the product obtained by subjecting meat to a process of comminuting, drying, curing, smoking, cooking, seasoning, or flavoring, or to any combination of such processes.

(a) *Cured meat* is obtained by a process of salting, the employment of dry common salt or of brine, with or without use of one or more of the following: sodium nitrate, sodium nitrite, potassium nitrate, sugar, dextrose, a sirup, honey, spice.

(b) *Dry salt meat* has been cured by application of dry common salt, with or without use of one or more of the following: sodium nitrite, sodium nitrate, potassium nitrate, sugar, dextrose, a sirup, honey, spice; with or without injection into it of a solution of common salt to which may have been added one or more of the following: sodium nitrate, sodium nitrite, potassium nitrate, sugar, dextrose, a sirup, honey.

(c) *Corned meat* has been cured by soaking in, with or without injecting into it a solution of common salt, with or without one or more of the following, each in its proper proportion: sodium nitrite, sodium nitrate, potassium nitrate, sugar, dextrose, a sirup, honey, and with or without use of spice.

(d) *Sweet pickled meat* has been cured by soaking in, with or without injecting into it a solution of common salt, with sugar and/or dextrose, a sirup, and/or honey, together with one or more of the following, each in its proper proportion: sodium nitrite, sodium nitrate, potassium nitrate, and with or without the use of spice.

(e) *Dried meat* is obtained by subjecting fresh or cured meat to a process of drying, with or without aid of artificial heat until a substantial portion of the water has been removed.

(f) *Smoked meat* is obtained by subjecting fresh, dried, or cured meat to direct action of smoke either of burning wood or similar burning material.

(g) *Canned meat* is fresh or prepared meat packed in hermetically sealed containers with or without subsequent heating for purpose of sterilization.

(h) *Hamburg*, "Hamburger steak," is comminuted fresh beef with or without addition of suet and/or seasoning.

(i) *Potted or deviled meat* is obtained by comminuting and cooking fresh and/or prepared meat with or without spice, and is usually packed in hermetically sealed containers.

(j) *Sausage meat* is fresh or prepared meat, or a mixture of fresh and prepared, and is sometimes comminuted. The term "sausage meat" is sometimes applied to bulk sausage containing no meat byproducts.

74. Inspection.—*a. Authorized agencies.*—(1) The Bureau of Animal Industry, United States Department of Agriculture, makes inspections of all meats and meat products entering interstate or foreign commerce for soundness and fitness for food. All carcasses passed for food are marked on each primal part (wholesale cut) with a stamp bearing the inspection legend "U. S. Inspected and Passed" or an abbreviation thereof, and the establishment number. The inspection legend guarantees that at the time it left Government supervision the meat or meat product was sound, wholesome, and fit for human food. At no time should meats for Army use be accepted unless they have been inspected ante mortem and post mortem by the Bureau of Animal Industry or other authorized inspection agency.

(2) The Veterinary Corps, United States Army, is charged by regulations with the inspection of meats and meat products purchased for the Army, for compliance with specification requirements. Where possible such inspections are made at the packing plant, and otherwise upon delivery at points where representatives of the Veterinary Corps are assigned.

b. Grades and standards.—(1) The Agricultural Marketing Service, United States Department of Agriculture, conducts a grading service for fresh carcass beef and wholesale market cuts. Such grading is done in conformity with grades established by that bureau. Department of Agriculture grades are not generally used by packers except where such grading is demanded by consumer or retailer.

(2) Grades for fresh beef have been established by the Institute of American Meat Packers, and are used by practically all members of the institute. They differ from the Department of Agriculture grades in that there are three more grades in the former than in the latter.

(3) Definitions and standards for lard, hams, bellies, and other pork products have been promulgated by Boards of Trade, notably the Chicago Board of Trade. These standards govern quality, style of cutting, etc., of such products dealt in on such boards.

(4) Packers have adopted brand names for carcass beef, lard, smoked meats, canned meats, etc., each brand name designating defi-

nite qualities, standards for which are set up by individual packing plants. Since brand names are copyrighted and adapted to products of individual firms, they are of little value to the inspector unless he is familiar with the standards set for such brands.

c. References.—Wherever possible inspection of meats and meat products for compliance with specification requirements and suitability for service use should be made at the packing plant. Since this inspection is a function of the Veterinary Corps, inspection procedure is not given here. Personnel interested in this phase of inspection are referred to the following publications:

Military Meat and Dairy Hygiene—Eakins.

Subsistence Bulletin No. 18—Fresh Meats.

Subsistence Bulletin No. 5—Packing House By-Products.

Subsistence Bulletin No. 17—Cured and Smoked Meats.

United States Department of Agriculture:

Circular No. 288, Market Classes & Grades of Pork Carcasses and Fresh Pork Cuts.

Circular No. 208, Market Classes and Grades of Yearling Beef.

Circular No. 103, Market Classes and Grades of Calves and Dressed Veal.

Bulletin No. 1246, Market Classes and Grades of Dressed Beef.

Bulletin No. 1470, Market Classes and Grades of Dressed Lamb and Mutton.

Institute of American Meat Packers, Standard Beef Grading System.

d. Equipment.—Reinspection of meats at delivery point should be made by a representative of the Veterinary Corps where one is available; where none is available, that duty usually devolves upon the Quartermaster Corps. Reinspection is concerned most particularly with soundness, net weight, condition, etc. The following inspection equipment is required for reinspection of meats:

(1) *Fresh meats.*—Platform scale for weighing heavy commodities such as beef quarters, etc.

(2) *Smoked meats.*—Meat trier, a polished steel blade about 7 inches long and about $\frac{3}{8}$ inch thick at the base and tapering to a blunt point at the free end, set securely in a wooden handle. A pitchfork tine makes an ideal trier blade.

(3) *Canned meats.*—(a) Can opener, either stationary or portable.

(b) White enamel lined pans or other suitable containers to display can contents.

(c) Refrigerator to chill certain products designed for slicing.

(4) *Sausage*.—Sharp knife.

(5) *Lard and lard substitutes*.—(a) Stove or gas or electric plate or burner with which to melt and heat product.

(b) Bottles of clear glass in which to inspect for color.

75. Beef.—Reinspection of fresh beef at delivery point should take into consideration net weight of quarters or wholesale cuts or packages, equal numbers of hinds and fores, proportionate weights of hinds and fores and of wholesale market cuts, and freedom from bruises, sliminess, sourness, or other evidence of deterioration.

a. Net weight.—Quarters, wholesale cuts, and packages of fresh or frozen beef are weighed at time of packing and net weight applied by means of a stencil on coverings or by an attached card. Beef suffers progressive shrinkage in the cooler or freezer. When held for a considerable time before delivery, there may be considerable discrepancy between marked net and actual weight. For quarters held in a freezer for a period of 6 months, this discrepancy may be as much as 3 percent. In fresh chilled beef the difference should not exceed one-half of 1 percent. At delivery time all meats should be weighed and weights checked with the marked weights. Test of a representative number of units (quarters, etc.) should be made to determine average tare (covering). When purchased subject to acceptance at delivery point any shortage should be claimed by the Government.

b. Number of hinds and fores.—When purchased in quarters, equal numbers of hinds and fores should be delivered. The hind quarter carries a higher percentage of more valuable cuts and has less inedible portion (bone, tendons, etc.) than does the fore quarter, hence it is more desirable in the kitchen and is in greater demand in trade. Reinspection should insure delivery of hinds and fores in equal numbers.

c. Proportionate weights of hinds and fores and of wholesale cuts.—Because of greater market value of hind quarters care should be taken to check proportionate weights of hinds and fores delivered. Specification PP-B-221 sets forth proportionate weights of hinds and fores under various methods of ribbing. When hinds of minimum weight are delivered corresponding fores should be of minimum weight also. The same is true of wholesale beef cuts. Subsistence School Bulletin No. 33, Fresh Meats, lists beef cuts in the order of their usual normal market value and gives proportionate weight of each cut. Where use of all cuts is contemplated they should be in proportionate weights as found in carcass.

d. Coverings.—The purpose of covering beef is to protect it from contamination by dirt, filth, insects, etc. Coverings for Army delivery should be ample and of such quality that complete protection is afforded. Heaviest coverings are necessary for frozen beef because of the harder usage they receive. Coverings for fresh beef may vary from none to complete wrapping or sewing in paper, stockinette, muslin or burlap, varying with length of haul, number of handlings, exposure to air, length of storage, etc. Coverings should be those prescribed in invitations for bids.

e. Soundness and condition.—(1) *Bruises.*—Soundness and condition refer to presence or absence of such factors as bruises, sliminess, sourness, blood clots, flesh firmness, etc. Bruises occur before the animal is killed and consist of injured tissues and ruptured blood vessels with infiltration of blood into the bruised area. Bruises are important because they result in waste since bruised areas must be trimmed away, and because the blood in bruised areas is not stable and decomposes sooner than sound tissue. Bruises are usually the result of rough handling and are found most commonly on prominent body parts such as point of the hip. While small surface bruises are easily trimmed away without appreciable loss, all bruises should be viewed with suspicion and bruised carcasses accepted with caution. For example, a bruise at the hip point may result in infiltration of blood along the pelvic bone and into the loin muscle. Bruises that require much trimming result in decreased percentage of edible portion and corresponding increase in proportion of bone. Such carcasses and cuts should be rejected when offered for Army use. Rounds or other beef cuts showing large blood clots should be rejected.

(2) *Spotters.*—"Spotters" are beef carcasses in which small blood spots appear throughout muscle tissue. The spots occur only in carcasses of better grades, and are the result of rupture of muscle fibers due to unusual muscular effort put forth during loading, unloading, and marketing of the cattle. Spots may vary from the size of a pinpoint to as much as $\frac{1}{2}$ inch in diameter. In the uncut side it is best observed in the flank or the skirt; after ribbing, in the eye of loin or rib; after cutting, on any cut surface. In the uncut side spotters can be overlooked easily. Spotters should not be accepted for Army use unless the spots are small and very few in number. While not injurious to health, presence of blood reduces keeping qualities of the meat.

(3) *Sliminess.*—Sliminess is the result of bacterial growth and is evidence of lack of proper temperature and moisture control in the refrigerator. Sliminess is usually first noticed on those parts where

circulation of air is most restricted such as underneath skirt and hanging tenderloin, and on the inside of the flank. Sliminess is evidenced by moist, sticky surfaces accompanied by a distinct odor which in advanced cases may become very offensive. When offered for Army acceptance slimy beef should be rejected since it indicates faulty handling. However, sliminess is a surface condition and when developed on beef in organization ice boxes, unless extensive or of long standing, is of little importance since it can usually be washed off. At the worst a small amount of surface trimming will usually remove evidence of slime. The seriousness of surface slime lies in evidence that the meat has not been properly handled and as a result, internal deterioration not evident on the surface may have taken place.

(4) *Sourness*.—Beef does not become sour readily if properly chilled promptly after slaughter. However, if chilling proceeds slowly or the meat is cut before thoroughly chilled, and especially if piled up instead of being hung separately, it is apt to become sour. Sourness is largely confined to the hind quarter and particularly to the round. Because of the greater thickness of the round, this cut chills less slowly than other parts of the carcass, and the deep tissues along the thigh bone (femur) and around the hip joint may become sour before chilling is completed. Sourness results in offensive odors the extent of which depends upon the extent or degree of sourness. Sourness is ascertained by means of a long, steel trier which is inserted into the round to a point near the hip joint. Sourness can be detected by smelling the trier immediately after it is withdrawn. Ordinarily there is so little sourness that inspection therefor is not carried on as routine procedure. Upon cutting, if sour areas are discovered they may be trimmed away, or if sourness is extensive, the quarter may be returned to the contractor. However, it is necessary that sourness be determined definitely.

(5) *Firmness*.—Even with modern refrigeration equipment and methods, beef does not become well chilled in less than 36 to 48 hours. When carcass beef is cut before it is well chilled and muscles set, quarters and wholesale cuts lose their shape. While cuts that are misshapen are as nutritious as those that are symmetrical, they are not so attractive in appearance and are more difficult to cut satisfactorily. Their chief importance is in the implication that the meat was inadequately chilled and therefore more prone to early deterioration than well chilled beef. Beef showing evidence of in-

adequate chilling when received should be inspected carefully for soundness.

f. Tests for frozen beef.—Reinspection of frozen beef should cover completeness of freezing and evidence of refreezing. Completeness of freezing may be determined in one of three ways, by—

(1) Striking quarter or wholesale cut with an iron bar. If solidly frozen, bar will rebound and a resonant sound will be heard; if not solidly frozen, bar will not rebound and a dull sound will be given off.

(2) Boring into meat at thickest part with an augur which will penetrate as far as the meat is solidly frozen, but will stop when an unfrozen area is encountered. The augur will not penetrate bone and in boring process bones should be avoided.

(3) Sawing through quarter or cut at thickest part. If solidly frozen, a smooth, hard surface resistant to penetration of a trier or other sharp instrument will be exposed; if not solidly frozen, cut surface will be ragged and any unfrozen areas can be penetrated easily with trier.

Inspection of frozen meat for condition other than freezing can be done only after thawing.

g. Color and texture.—Color and texture of beef are closely allied to quality, condition, and tenderness. Only by experience can an appreciation of the proper color of beef be acquired. Normal color of veal is pale pink; as age increases flesh becomes a deeper color. Color of mature beef is influenced by sex condition, kind of feed received prior to slaughter, condition of animal at time of slaughter, temperature at which meat is held, length of time held, and exposure to air.

Steers and heifers usually have maximum fine color (light red). Meat of bulls is dark red, while that of stags is intermediate between that of bulls and steers. Cow meat usually is a light red resembling that of steers and heifers, but fat of cows is always yellow, varying from a tinge to a deep shade. Fat of steers and heifers is usually creamy white. Grain feeding, particularly corn, results in firm flesh with lively bloom, and firm, white or creamy white fat, while feeding oil meal, soybeans, and other oily feeds results in dull, reddish-brown color and soft texture of both flesh and fat. Carcasses from cattle fed on grass usually have a reddish (fiery) appearance. The grass grown in some districts produces firm, white fat, but usually grass-fed beef is not as firm nor as white as corn-fed.

Animals in high stage of excitement or with high temperature at time of slaughter do not bleed well and produce dark meat.

Freshly cut surface is somewhat dark but becomes a lighter color when exposed to air for an hour or so. When exposed to air in a cooler over a period of several days, the cut surface gradually darkens and becomes quite dark after 3 or 4 weeks of aging. When kept at a warm temperature, beef darkens more rapidly than at cooler temperature. The cut surface of meat dehydrates and becomes a grayish color when exposed to the cold and relatively dry air of a freezer. Extent of dehydration and depth of decoloring depend upon length of time in the freezer. After 6 months in a freezer the dehydrated area may reach a depth of $\frac{1}{8}$ to $\frac{1}{4}$ inch. "Freezer burnt" beef is dry, lacks palatability, and has an unattractive appearance.

"Lively" color and fresh "bloom" usually indicate tenderness, while a dark color usually indicates toughness. This is not always true, since at times well-fed steer carcasses cut dark and yet may be tender. However, prejudice against dark beef reduces grade of dark-cutting, sometimes as much as three grades. Bull meat is always dark in color and is always tough.

Fat of frozen beef changes but little in color and texture during the first 6 months in the freezer. After 6 months the fat becomes brittle, crumbles easily, loses its bloom, and becomes dull in appearance.

In reinspecting beef for color, consideration should be given to storage conditions (temperature and humidity), length of time cut and exposed to air, whether fresh or frozen, etc. If any doubt exists as to class, grade, and condition, a thin slice should be cut from the cut surface and color underneath noted.

With few exceptions fine texture accompanies good color; dark color is frequently accompanied by coarse texture. Fine texture is smooth, silky and moist to the touch, while coarse texture is rough, coarse, and frequently gummy or sticky. Texture is determined on the freshly cut surface. In determining texture, consideration should be given to all muscles of the carcass or cut. Muscle fibers of the skirt, hanging tenderloin, flank, and neck are large but should not be considered coarse unless the other muscles are coarse also. Coarse beef is undesirable for Army use.

h. Transportation.—Fresh and frozen beef are perishable products and should be kept under refrigeration until prepared for use in the mess. For other than local deliveries refrigerator cars or refrigerator trucks are essential to keep product in good condition. For long hauls fresh beef should be hung from overhead racks by means of hooks. Frozen beef is piled upon floor racks. Fresh beef should never be piled for long hauls. For railhead distribution fresh beef

may be piled on truck floors but the depth should be kept as shallow as possible. Underchilled meat should never be piled.

i. Handling.—Beef, either fresh or frozen, should never be piled on a dirty floor. Trucks to be used for fresh meat transportation should be scrupulously clean, and floors covered with paper or clean canvas. All trucks used for hauling fresh meats should be covered with tarpaulins to exclude heat, dust, flies, rain, etc. In hot weather, showering truck coverings with water tends to prevent a too abrupt rise in temperature. Beef handlers should wear clean clothing, and all benches, cutting blocks, tools, and equipment should be scrupulously clean. Beef that becomes wet or contaminated with dirt spoils more readily than dry, clean beef. Surface of all contaminated beef should be trimmed as soon as possible.

j. Storage.—Beef has excellent keeping qualities. Under proper storage it will remain in good condition for a longer period than any other fresh meat. For best storage condition, it should be hung so that there is good circulation of air entirely around each cut in a cooler temperature of about 36° F., and relative humidity sufficiently high to prevent excessive drying and not so high as to permit meat becoming wet. The relative humidity that can be maintained safely in a storage room depends upon constancy and velocity of air circulation. In constantly moving air a relative humidity of 90 can be maintained safely, but in still air a much lower relative humidity is necessary to prevent wet surfaces and resultant bacterial growth (sliminess). The more restricted the circulation of air and the higher the temperature, the shorter will be the safe storage time. Beef is the one class of meat that improves in tenderness and flavor with age. Fresh beef is practically always tough. Tenderness increases for a period of 2 weeks or more in proper storage, and flavor and palatability increases for a period of a month or more. Aging is not essential for Army use since fresh beef is usually at least a week old before it reaches the mess table and has attained sufficient tenderness and flavor for use. Beef not more than 1 week old seldom needs any trimming while well-aged frequently must be trimmed. Trimming results in losses not contemplated in Army messes. Growth of mold is of no particular significance or importance. Meat molds are not harmful when eaten. If extensive, they may impart a moldy flavor unless carefully washed off or trimmed away.

76. Pork.—*a. Sex.*—In grading fresh pork but little distinction is made with regard to sex. Male hog (barrow, stag, and boar) carcasses can be distinguished from female (gilt and sow) by presence of a cartilaginous button (pizzle-eye) at the posterior end of

the aitchbone and a streak of lean in the cut edge of the belly of all male and their absence from female carcasses. Stags and boars are very coarse in quality and dark in color, and sows have considerable development of the mammary glands (seeds). Boar carcasses and cuts practically always carry a strong (sexual) odor which is particularly prominent when the meat is heated. Grading is based more upon quality than sex.

b. Quality.—Quality is based upon color and texture of skin, flesh, and fat, and color and size of bone. Good quality is indicated by soft, flexible, white skin free from wrinkles and bristles; firm flesh of a lively light red color and fine texture; firm, white fat; and small, red bone. Oily feeds produce pork that is oily in appearance and touch, not firm, and that loses its lively color and becomes dull. Stags and boars always produce flesh coarse in texture and dark in color, and skin that is coarse, thick, and lacks flexibility. Carcasses and cuts that lack good quality as indicated by color and texture should be rejected. Large, white, hard bone indicates age, and flesh attached to such bone is invariably tough. Spareribs and loins that show rib bones of this character should be rejected as not good quality. In inspection of carcasses presence of well-developed mammary glands should be cause for rejection since it results in considerable waste. Mammary glands (seeds) are found along edge of the belly in tissue surrounding the teats. Seeds are practically absent from barrow bellies, small and usually white in gilt bellies, and large and either red or black in sow bellies.

c. Bruises.—Pork is very susceptible to bruises. However, bruises are largely superficial and confined to the skin and underlying fat. Whip marks confined to the skin alone are of little importance, but when deeper tissues are involved with blood infiltration, bruises become important since they represent a direct loss, and such areas decompose more rapidly than healthy tissue. Bruised carcasses and cuts should not be accepted for Army use.

d. Storage.—Compared to beef, pork has very limited keeping qualities. It does not improve with age either in tenderness or flavor. The fat is not as stable as that of beef, and early deterioration is usually first noted in the fat which tends to break down with liberation of fatty acids under influence of warmth, light, moisture, and air. Bacterial growth on the surface produces slime. Pork must be chilled thoroughly and quickly, and must be kept under refrigeration until prepared for use. Fresh pork should be marketed as soon as possible after it is cut. If it must be held for as long as a week, it should be frozen to prevent deterioration. If

handled promptly it seldom becomes moldy. Sour meat is not often found.

e. Condition.—For Army acceptance cuts should be clean, fresh, sweet, a good color, and free from sliminess. Frozen cuts should be delivered solidly frozen and should not show excessive freezer burn or evidence of thawing and refreezing indicated by loss of bloom. Cuts should be individually wrapped in greaseproof paper or packed in boxes or other substantial containers lined with greaseproof paper.

f. Cuts.—With exception of a small percentage of shipper pigs for special trade, fresh pork is marketed in the form of cuts rather than carcasses. Army messes utilize cuts to better advantage than carcasses. A regular ham should have the foot cut off through or above the hock joint, and have entire back covered with the skin. The shank of a skinned ham is cut in the same manner as for regular hams, but the skin is removed from the back to within 4 inches of the shank, and much of the fat trimmed away. Skinned hams are more economical for use in Army messes because of the greater waste on regular hams. A fresh shoulder, hock on, should have the foot removed above the knee joint; a shoulder, hock off, should have the leg removed at approximately the elbow joint. A skinned shoulder should have the skin removed from the back to within 4 inches of the shank and have excess fat removed. Skinned shoulders have the hock on.

77. Veal.—*a.* United States Department of Agriculture Standards defines veal as meat derived from young cattle 1 year or less of age. Many States also have established definitions for veal. By general acceptance the trade considers genuine veal to be derived from young calves fed on whole milk or that have suckled their dams. Such veal has flesh of a light pinkish-brown color, fine, delicate texture, firm, white fat, and red bones with glistening white cartilage. Calves fed on skim milk do not produce fat that is so white, firm, or abundant. Calves approaching 1 year of age and given feed other than milk gradually lose the light pinkish-brown color and assume the darker red of mature beef. Since veal carcasses have little or no outer covering of fat, they are dressed skin on to prevent excessive drying and darkening. Some carcasses are shipped with skin on to protect them further during transportation. However, most carcasses are skinned before they leave the packing plant. For Army use veal should never be accepted skin on, and final acceptance on initial inspection should never be made until after the skin is removed because of prevalence of bruises. Veal tissues are tender and easily bruised. Bruised car-

casses should not be accepted for Army use because of waste involved. Because of lack of fat covering, veal cannot be aged like beef since it dries out excessively with age. In addition, veal is invariably tender and does not need aging to make it tender, nor does it improve in flavor. Veal should be used as soon as possible after it is chilled thoroughly to avoid discoloration, or it should be frozen for holding. Veal is never marbled as is mature beef.

b. Reinspection of veal at delivery point should include determination of net weight, sufficiency and condition of coverings, condition and soundness. Net weight should be exclusive of coverings. Coverings should keep meat clean and should restrict circulation of air and thus preserve surface color. Veal should not show surface moisture, stickiness, or slime, all of which indicate improper temperature. A dark surface color indicates excessive drying. Veal that has lost its bloom should be rejected. Firmness is largely dependent upon presence of fat. Veal that has firm, white fat covering the kidneys, in the pelvic cavity, in the lumbar region, and a covering over the outer surface is invariably firm. Absence of fat in those regions indicates poor feeding, the meat is soft, flaccid, and has inferior food value and palatability, and such veal should be rejected. Milk-fed veal is seldom obtained in weights prescribed by Federal specifications.

78. Lamb.—The United States Department of Agriculture defines lamb as meat derived from young sheep 1 year of age or less. Lamb is meat derived from immature sheep, and is characterized by red bones, white cartilages, small compact carcasses, a light reddish meat color, and presence of the breakjoint. No distinction is made in sex.

a. General.—Bones of young lambs are red in color. This is best observed in the cut bones of the brisket, in the ribs in the inner wall of the thoracic cavity, and at the breakjoint. This redness diminishes as the lamb nears maturity. Cartilages of young lambs are glistening white, but lose some whiteness and size with maturity. Practically all lambs marketed in the United States are produced on the range from mutton breeds which produce lambs that are short-coupled, blocky, and compact. The meat is a pinkish-red color which deepens with approach of maturity. Hind feet are removed at the fetlock joint. Front feet are removed just above the fetlock joint at what is known as the breakjoint. The articular surface of the shank bone is removed with the foot, leaving a broad surface with eight raised eminences.

b. Breakjoint.—In young lambs the breakjoint is red in color and smooth to the touch; as the animal approaches maturity the redness

disappears and the broken surface becomes rougher. In mature sheep (more than 1½ years old) the breakjoint is ossified and does not break, leaving the rounded articular surface on the end of the foreshank. Sometimes attempts are made to make an artificial breakjoint by cutting or breaking off the end of the shank, but this is readily detected by its white appearance and rough and splintered surface. Sheep are considered by the trade to be lambs so long as they show a well-defined breakjoint.

c. Market.—Some lambs in the Southern States are dropped (born) about the New Year and reach market as “hot house” lambs about Easter. These are small, very immature lambs for which there is very limited trade. They are usually dressed “pelt on” to preserve color. Range lambs are usually dropped during March and April and begin to move to market about July 1. Young lambs are plentiful during the fall and winter. Those reaching market during late winter and spring are really yearlings, but are considered lambs if the breakjoint is in evidence. During this period it is frequently difficult to obtain lambs of weights prescribed by specifications.

d. Dressing.—In commercial practice the spleen is allowed to remain with the carcass. It is found loosely attached to the diaphragm (skirt). Federal specifications require that all viscera, including the spleen, be removed. Before the World War practically all lambs were “caul dressed,” that is, the belly edge of the carcass was spread wide and held in place with cross sticks across the back, and the caul was spread over the face of the lamb to give it a fatter appearance. This also allowed disposal of cheap caul fat at lamb prices. Caul is the wide, lace-like, filmy fat attached to the paunch. “Round” lambs are simply lambs that have not been spread as above. All lambs are now round-dressed, caul dressing having been discontinued. Because of protection afforded by the pelt, bruising is much less common than in pork, veal, or beef.

e. Storage.—Lamb does not improve in tenderness and flavor with age. Aging is not practiced commercially. It is best while still possessing bloom of freshness. Lamb to be held for periods longer than a week or two should be frozen and it should be kept under refrigeration until used.

79. Mutton.—*a. Definitions.*—(1) *Mutton* is meat derived from sheep nearly 1 year of age or older.

(2) *Wethers* are male-sheep castrated when young.

(3) *Ewes* are female sheep and the term is usually applied to mature sheep.

(4) *Bucks* are mature male sheep.

(5) *Dry ewes* are ewes not producing milk.

b. General.—Mutton is characterized by whiter and harder bones, deeper red color of meat, less compact conformation than lamb, and absence of the breakjoint and presence of a rounded articular surface at the end of the foreshanks.

c. Carcass.—Cut surfaces of brisket bones of mutton usually have lost their soft texture and red color and are hard, brittle, and reddish-white to white, depending upon age of the sheep when killed. Ribs on inner surface of the thoracic cavity are white and large. Meat is a deeper red than that of lamb. In the United States the only mutton that reaches market is from breeding stock, largely ewes and a small percentage of bucks. Practically no wethers are held beyond the lamb stage. Because they have been used for breeding purposes, old ewes are less compact in form than lambs, and are rangy, lanky, and ribs are distended (barrel-shaped). Because they have given birth to young, the vent is much larger than on lambs and bucks. Usually no udder tissue is present on the dressed carcass but is cut away on the filling floor. The neck of a ewe is usually long and slender and hip bones prominent. While some fat ewes reach the market, most ewes are thin, poor in flesh, and poorly covered. Bucks usually show masculine characteristics of the entire male animal, thick, short neck, heavy shoulders, little or no cod fat, and an open inguinal canal. The breakjoint is absent in all mutton.

d. Delivery requirements.—Federal specifications for mutton prescribe that deliveries consist of not more than 50 percent ewes. The balance must be well-matured wethers. Since wethers are practically never grown to full maturity but are marketed as lambs, inspection and reinspection of mutton should be largely concerned with the percentages of wethers and ewes delivered. Buck carcasses are invariably coarse and tough and for that reason are undesirable. They should be excluded from delivery. Wether carcasses lack masculine characteristics of bucks and have an abundance of cod fat depending upon degree of fattening, and there is no evidence of an open inguinal canal. Necks of wethers are short and plump but the shoulders and necks are not massive as in bucks. Cod fat should be abundant. In the inspection of ewes care must be exercised to secure prescribed quality. Very few ewes have compactness of form, quality or finish required by specifications.

e. Storage.—Mutton does not improve in flavor or tenderness with age. While mutton may be kept in a chilled state for 2 weeks or more, it is not improved by such storage. Mutton is best while possessing the bloom of freshness. When kept for longer periods,

it should be frozen. Frozen mutton does not deteriorate appreciably during the first 6 months in cold storage. It loses its bloom after that period, the fat becomes crumbly and a dull color, and because of the considerable surface exposed to air drying is inevitable. Frozen mutton should be checked carefully for net weight.

80. Specialties.—*a. General.*—Meat specialties are perishable products and should be chilled promptly, kept under refrigeration at all times until used, and frozen solid if not used promptly. For prompt chilling beef hearts, livers, tongues, and oxtails are hung from hooks, while kidneys, sweetbreads, brains, and sheep and hog hearts are spread on trays. The more promptly and completely they are chilled, the better will be their keeping qualities. In reinspection at delivery, consideration should be given to proper identification, quality, and condition.

b. Hearts.—Purchases are restricted to beef hearts. In official establishments all beef hearts are cut open for inspection purposes. Should whole hearts be delivered, the inspector should suspect that they may have come from an unofficial establishment, and should look for the inspection mark which should be branded on each by means of a burning brand. They should have the heart caps (auricles) removed since these are thin-walled, fibrous, and of inferior food value. Hearts from young cattle have a small piece of cartilage embedded in the muscle tissue. In those from old cattle this cartilage may have turned to bone. Hearts from grain-fed beef cattle are thick-walled, meaty, and have a collar of firm, creamy white fat around the base and along the seam between the lobes of the heart. Hearts from dairy cows and from underfed cattle have less fat and its is not so firm nor so creamy white in color. Calf hearts have much the same characteristics as beef except that they are smaller, are frequently sold cap on, and amount, firmness, and color of fat will depend upon feed the calf received. Hog hearts are smaller, fat is much whiter and less firm than beef, caps are not removed, and they have a softer, oilier feel than beef hearts. Sheep hearts are much smaller than hog, and fat is much firmer. To meet specification requirements, beef hearts should be strictly fresh, firm, thick meated, surface free from moisture or slime, free from blood clots, have a lively red color of meat, and fat should be abundant but not excessive and of firm texture and creamy white color.

c. Livers.—(1) *General.*—Federal specifications provide for purchase of calf, beef, and lamb livers. Since these represent a considerable range in quality and market value the inspector should be able to

recognize kind and quality offered. Calf livers have the highest market value.

(2) *Veal and calf*.—In many markets distinction is made between veal and calf livers. Both should weigh not to exceed $3\frac{1}{2}$ pounds. Veal livers are from young, milk-fed calves and are a light chocolate color, while calf livers frequently are from older calves or from those not fed on milk, and are a darker brown color, some being almost black. Veal livers are always tender, have very little tendonous structure, and have the most desirable flavor and appealing color. Calf livers compare very favorably with veal in tenderness, but because of the difference in feed the calf received are not so palatable in flavor, have less nutritive value, and are not so attractive in color.

(3) *Yearling*.—"Yearling" is the term commonly applied to bovine livers weighing $3\frac{1}{2}$ to 7 pounds; those over 7 pounds are called beef. Yearling livers are from young beef cattle, have good conformation and color, and are very desirable because of their appearance and good flavor, and because they have developed little tendonous structure. They are second to veal and calf livers in market value.

(4) *Beef*.—Beef livers are designated as steer and cow livers and vary greatly in market value. They weigh over 7 pounds. Steer livers are short, plump, very thick at the large end and taper gradually to a very blunt edge at the opposite end (see figs. 1 ① and 2). Cow livers are usually elongated and are usually thin in the middle and large at each end (see figs. 1 ② and 3). The color may vary from a very light straw to almost black. Very light-colored livers are always very friable and easily broken down. While some straw-colored livers are taken from fat steers, most of them come from cows nearing parturition. Cow livers are usually very dark in color. Dark-colored beef livers are invariably tough. The surface of cow livers is frequently uneven and sometimes pitted. For Army use beef livers should be plump, firm (without being flabby or hard), short, of light mahogany color, and have smooth, unblemished surfaces. Mutilated (cut or torn) livers should not be accepted.

(5) *Lamb*.—Lamb livers are smaller than veal, are invariably a dark mahogany color, and differ in conformation. Calf livers have two main lobes and a third smaller lobe. When held with the large end upward, the two main lobes hang one below the other in almost straight lines, with only a small notch on one side to indicate the division between the two main lobes (see fig. 4 ①). Lamb livers have a very deep notch (extending almost half way across) which divides it into two distinct lobes, and the lower lobe has a distinct twist to one side (see fig. 4 ③). In both veal and lamb

livers the third lobe is attached behind the upper main lobe. Sheep livers can be differentiated from lamb only by size. Little or no distinction is made between the two by the trade. Lamb livers lack the flavor characteristic of veal and good beef.

(6) *Hog*.—Since hog livers are inferior to either lamb, veal, or beef in flavor, tenderness, and market value, the inspector should be able to differentiate between them. Hog livers are divided into four lobes of about equal size by three deep notches (see fig. 4 ③). When laid flat these lobes spread out fanwise and the free edges of the lobes are very thin. Hog livers are invariably dark in color. They should never be accepted in lieu of veal, beef, or lamb.

The gall bladder should be removed from all livers delivered under Federal specifications.

The difference in shape and conformation of veal, beef, sheep, and hog livers is shown in figures 1, 2, 3, and 4 below.

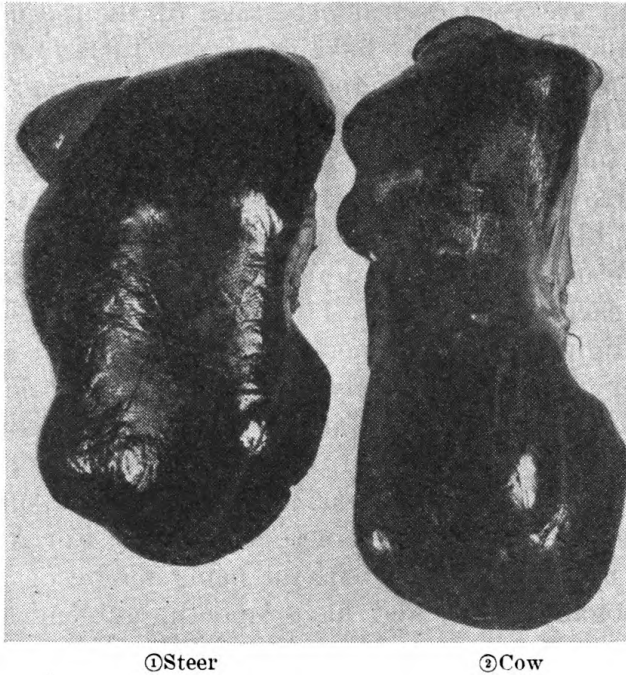


FIGURE 1.—Beef liver.

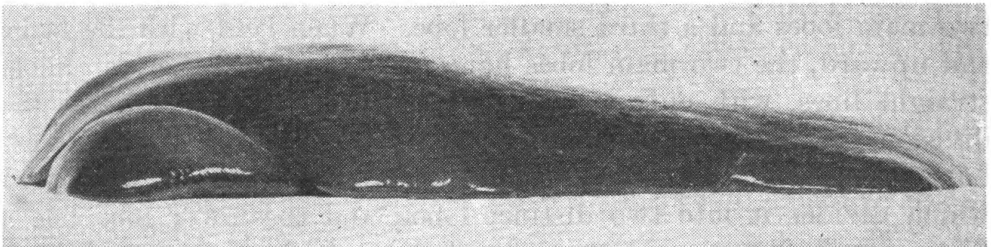


FIGURE 2.—Steer liver (side view).

d. Kidneys.—Beef kidneys vary in color from a sickly yellowish-white to almost black. Steer and heifer kidneys usually have a light or dark mahogany color while cow kidneys vary greatly. The difference in texture also varies greatly; steer and heifer kidneys are usually firm and well shaped while those of a cow may be misshapen and are usually soft and flaccid. Beef kidneys are divided into many irregular lobes by deep fissures (see fig. 5 ①). These lobulations are characteristic of bovine kidneys. To meet specifica-

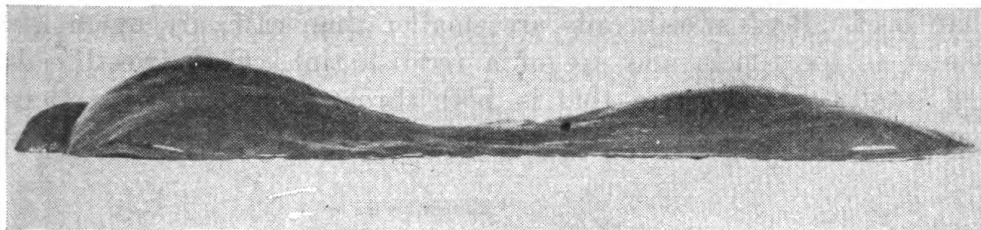
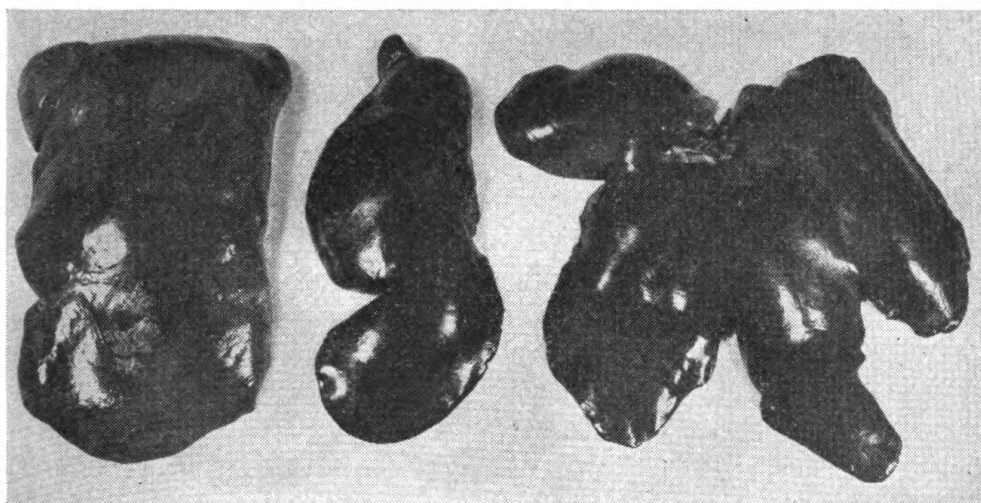


FIGURE 3.—Cow liver (side view).



①Veal liver.

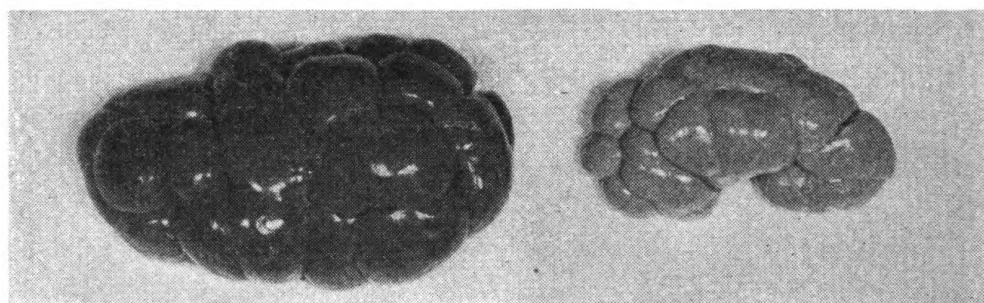
②Lamb liver.

③Hog liver.

FIGURE 4.

tion requirements beef kidneys should be plump, firm, and a mahogany color. Beef kidneys are differentiated from those of other food animals by their size, shape, and presence of lobes. Calf kidneys are lobulated but are smaller than beef (see fig. 5 ②). Hog kidneys are smaller than calf, are elongated, and are not lobulated (see fig. 5 ④). Sheep kidneys are much smaller than hog, have a smooth surface (not lobulated), and have a distinctive kidney bean shape (see fig. 5 ③).

e. Sweetbreads.—Sweetbreads are the thymus glands of young bovines. The gland lies along the left side of the throat and extends into the thoracic cavity. It is largest in veal calves and is still of considerable size in yearlings. The gland is divided into two parts, the one from the throat being elongated and the other at the thoracic end being rounded and about the size of the palm of the hand. Calf sweetbreads are large, very tender to the touch, and almost white in color. They are the most desirable from the standpoint of tenderness and flavor, and sell at a much higher price than beef. Beef sweetbreads are smaller than calf, are much less tender to the touch, and are of a reddish tint. Calf sweetbreads are usually sold in pairs, that is, both throat and thoracic portions wrapped together in waxed paper. Sweetbreads are chilled by



① Beef.

② Veal.



③ Lamb.

④ Hog.

FIGURE 5.—Kidneys.

spreading on trays. If they are not to be marketed at once, they are packed in tin pails of about 5 pounds net weight and frozen. Sheep sweetbreads are very small and are packed in molds and frozen in blocks of about 1 pound. Inspection should determine class and condition. There are no grades within classes. Sweetbreads should have a fresh, wholesome aroma, be free from sliminess, and have good color characteristic of the class.

f. Brains.—Inspection of brains is chiefly for class differentiation and condition. Federal specifications provide for use of calf and

hog brains. Calf brains are much larger than hog or sheep but smaller than beef. Calves are not usually stunned before slaughter and the brains are therefore seldom clotted with blood. With exception of Kosher, beef cattle are always stunned, resulting in blood clots in practically every beef brain. Clotted blood is undesirable since it reduces keeping qualities. Calf brains should be firm but tender, and should have a creamy white color slightly tinged with red. Hog brains are small when compared with calf or beef. They are very soft in texture and are difficult to remove from the skull in whole condition. When placed on trays they flatten out and when handled are broken easily. The two lobes are separated easily. The cerebellum (second brain) seldom remains attached to hog brains. They are about the same size as sheep, but the latter are firm and very compact. The two lobes do not separate easily and the cerebellum is usually attached. When placed on trays sheep brains retain their plump, rounded contour. Sheep brains usually have a whiter color than hog. Since sheep brains have a higher market value than hog, there need be no fear that they will be substituted for hog. It is difficult to differentiate between a large calf and a young beef brain, but this is of little importance if they are in good condition. Brains should have a good color, have characteristic texture of the class, and have a fresh, wholesome aroma and appearance.

g. Tongues, beef.—Federal specifications require short-cut beef tongues. Long-cut beef tongues have attached the larynx, the epiglottis, two or three rings of the trachea, and fat. Most of these are inedible or of little use in an Army mess. Short-cut tongues have all of these appendages removed. Inspection should include trimming, quality, and condition. Closely trimmed tongues have all inedible (cartilage) parts and excess fat removed. Quality is indicated by size and texture of the tongue and color and texture of fat. Cow tongues are usually small and are hard and tough to the touch, and fat is usually scanty, of soft texture and a yellowish cast. Good beef tongues are plump, meaty, tender to the touch, and fat is abundant, of white color and firm texture. Fresh beef tongues retain their mucous membrane covering (skin), and are characterized by their roughness, having large papillae near the base and along the sides, and very hard, rough, but small papillae near the tip. Calf tongues have the same characteristics as beef except that they are smaller. Hog tongues are much smaller than beef. They are always short-cut but retain the epiglottis. The mucous membrane of hog tongues is always smooth, and that at the tip is

usually loosened due to the heat in the scalding vat. Hog tongues do not have the fine flavor of beef or calf and are much less desirable. Sheep tongues are very small. Beef tongues are subject to injuries. In inspection for the Army, any tongue showing scars of injuries or abscesses or having cuts or bruises should be rejected. Tongues should have a fresh appearance and aroma and be free from sliminess. Weight is of considerable importance in selection since the better quality is usually the heavier.

h. Oxtails.—Oxtails should be selected for color, meatiness, and texture. Tails from all cattle become oxtails in the trade. Cow tails are practically always bony, meat is scanty and tough, and fat is a yellowish color. Such oxtails are undesirable. Oxtails from young beef cattle are plumper, more meaty, meat is more tender, and fat is creamy white in color and of firm texture. Such oxtails are desirable. In a large measure, texture of the meat can be detected by pressure with the thumbnail.

i. Storage.—Meat specialties have poor keeping qualities. They should be kept under refrigeration until prepared for use. Frozen products should not be defrosted until just before using. They should be protected from dust and insect contamination by suitable wrapping or packaging. Defrosting frozen products is done most safely in a refrigerator.

81. Cured and smoked.—*a. Cured.*—(1) *General.*—Cured meats have better keeping qualities than fresh. Curing also changes the flavor by addition of salt and other curing agents and by enzymic changes taking place during curing process. Cured meats are very seldom frozen. Meats should not be cured until they are ready to be consumed as such or as preparation for smoking.

(2) *Fat backs, dry-salt.*—Good quality fat backs are indicated by soft, white, smooth, flexible skin and firm, white fat. Fat backs have no bone and very little lean meat. They are brushed as free of salt as possible for shipment and have salt crystals over entire surface. If delivered with excess salt, a tare test should be made by weighing before and after brushing with a broom. Yellow or a rusty color fat indicates keeping in cure for a long period.

(3) *Pork bellies, clear, dry-salt.*—The term “clear” means removal of all bones. Commercial practice sometimes leaves a small portion of sparerib on the brisket end, but Federal specifications require entire clearance of bone. Quality and surface salt are determined in the same way as for fat backs (see (2) above). Dry-salt bellies are made from heavy and from coarse bellies. All good quality weighing under 12 pounds are made into smoked bacon. The best dry-salt

cured bellies are made from barrow and gilt weighing 14 pounds and up. Practically all old sow bellies are dry-salt cured and are invariably seedy. Those that are large and coarse and that have large nipples (teats), or with evidence that large nipples have been cut away may be suspected of being from old sows. By cutting into tissues underneath and near the nipples presence or absence of seeds may be determined. Seeds are mammary gland tissue and are neither meat nor fat. Seeds that have been lactating (producing milk) are reddish brown in color. Size (extent) of seeds depends upon number of litters the sow has borne. They usually are not extensive after the first litter but increase in extent with each successive litter. Black seeds result from deposit of black pigment in mammary gland tissue, and are frequently found in dry sow bellies. Old sow bellies are undesirable because they are coarse and wasteful, and their acceptance is forbidden under Federal specifications. Barrows and gilts have rudimentary nipples and small, insignificant seeds or none at all. Gilt seeds, if present, are usually colorless (white). Barrows sometimes show traces of black seeds. Dry-salt are seldom trimmed as carefully as bacon bellies. Old sow bellies, particularly, are seldom cut square but are irregular in outline (see figs. 6 to 11, inc.).

(4) *Beef, corned, bulk.*—Bulk corned beef is pickle cured. During curing process the beef absorbs moisture as well as curing agents, and when taken from pickle will weigh from 5 to 8 percent more than the green weight. When cured corned beef is allowed to drain for a few hours after being taken from pickle it loses approximately 4 percent of its cured weight. In packing barrels or smaller containers for curing, only sufficient green meat is put in the container to produce prescribed net weight after draining. If delivered in pickle, the proper net weight should be ascertained by pulling and draining the meat for at least 2 hours, or making a deduction of 4 percent from the pulled weight. If delivered dry it should be taken at delivered weight. Federal specifications permit delivery in commercial containers. Both methods are used in commercial practice. Brisket corned beef must have all bones and deckel removed. Deckel is a layer of muscle and fat on the outer surface of the brisket. Plate (navel end) beef retains all bones. Commercial practice allows two or three vertebrae to remain on the rump, but Federal specifications require removal of all bones. Corned beef from steer and heifer carcasses are thick-meated and fat is white or creamy white, while that cut from cow carcasses is not so thick-meated and fat is usually not so firm and has a yellowish cast. Notwithstanding

that corned beef has been cured, it should be kept under refrigeration until used. In pickle in tight containers it will keep for a longer time out of refrigeration than will the dry product, and will not ordinarily spoil until the pickle spoils. Kept in pickle, particularly in warm temperatures, it will absorb salt rapidly and become very salty. A rusty color denotes age.

b. Smoked.—(1) *General.*—Cured and smoked meats have good keeping qualities. Ordinarily they do not need chillroom refrigeration but keep best at temperatures between 50° and 60° F. Good smoking is indicated by dry surfaces, shrunken skin, and a bright, light cherry color. Pale color, soft, flaccid skin, and soft, moist meat indicates insufficient smoking. Such meat does not store well, particularly if wrapped or piled since moisture in undersmoked meats furthers mold and bacterial growth. For satisfactory smoked products, meats must be properly cured before smoking, as undercuring and insufficient chilling before curing frequently result in sourness.

Sourness occurs most frequently in thick pieces and those that contain bones, such as hams, shoulders, etc., and is determined by use of a trier which is inserted into the meat at points most likely to show sourness, and is smelled as soon as it is withdrawn. A good trier will carry to the nose any odor of decomposition. Meat should never be tried in rapidly moving air since the odor is carried away before the trier reaches the nose. Triers must be made of good, highly polished steel. Iron triers do not carry odors accurately.

Commercial smoked meats usually carry the brand name, and each piece should carry inspection legend and establishment number. Smoked meats are usually wrapped. Only net weight should be paid for, and test for tare should be made on all shipments of wrapped products received. Wrapped hams, bacon bellies, etc., have the net weight stamped on the wrapper taken at time of wrapping.

Smoked meats are subject to shrinkage when held for sometime and if not kept dry are prone to mold, particularly if kept wrapped. Mold is not harmful to health but if extensive may impart a moldy taste to the meat, and it usually is removed readily by wiping with a dry cloth, by washing in salt brine or vinegar, or by trimming. Products that are moldy at time of delivery should be rejected. Removal from wrappings and hanging in good air circulation retards or prevents mold growth, but it also furthers shrinkage.

Smoked meats kept in a cooler usually lose some of the smoked color and bloom. Those removed from a cooler and placed in warm temperatures will sweat, and this surface moisture furthers mold and bacterial growth and reduces color. Smoked meats should be kept dry.

(2) *Hams*.—Ham inspection should be for type, grade, and condition.

(a) *Cut*.—American short-cut hams have the foot removed through or above the hock joint. Sometimes this cut is so high that the marrow canal of the shank bone (tibia) is open. Both regular and skinned hams are short-cut. Regular hams retain skin and fat over the back while skinned have skin removed to within 4 inches of the shank and surface fat trimmed off, the fat remaining being evenly tapered to the lean at the butt end. Skinned hams are more economical than regular in an Army mess unless skin and excess fat can be utilized to advantage. Regular hams with 1½ inches or more of fat at the butt end are quite wasteful. Such hams are seldom made into first grade regular hams but are skinned or placed in lower grades.

(b) *Grade and quality*.—Grade is indicated by conformation and quality. Good grade hams are short, plump, and thick, with short shanks, giving the highest percentage of good quality edible meat. Good quality is indicated by thin, smooth skin, firm fat, meat of fine texture and lively color, and small bone. Smoked calas or picnics which are made from shoulders should not be mistaken for hams. They are inferior in texture and tenderness, and have a higher percentage of bone and tendonous tissues to edible meat. The cut surface of ham meat usually shows a phosphorescent sheen. This is not a defect but a natural result of curing and smoking processes. A well-smoked ham is firm, the skin shrunken and not soft and flaccid. The best place to observe degree of smoking is on skin of the shank. If this is well-shrunken, firm, and good smoked color the ham has been properly smoked. Stockinnetted hams do not show as deep smoked color as those smoked naked.

(c) *Trier inspection*.—The trier should be inserted successively in the marrow canal of the shank bone (if it is open), into the shank near the stifle joint, along the thigh bone (femur), and under the aitchbone. Expertness in trier inspection results only from considerable practice. The sense of smell first must be trained to determine the natural aroma of sound smoked hams. Sourness is any variation from soundness including any putrefactive process, formation of gas, rancidity of fat, etc., and varies greatly in degree. The aroma of sound hams varies also. The inspector must learn to differentiate these various odors, and this is acquired only by experience.

(d) *Boned and rolled*.—Boned and rolled hams are prepared by boning the cured hams, tying tightly with string, and smoking.

Some are stuffed into artificial casings instead of being tied. A recent development in smoking is precooking during the smoking process. Such hams are subjected to smokehouse heat to cook sufficiently to make them tender and also render them safe for eating by destruction of any trichinae that might be present. Such hams are usually labeled to indicate precooking and need only warming to prepare for the table. Since only a small proportion on the market are precooked, all hams prepared in Army messes should be cooked to insure safety from trichinosis.

(e) *Storage*.—Keeping qualities depend upon kind of cure, extent of smoking, and moisture content. Mild-cured hams ordinarily do not keep as well as hard-cured. The longer the smoking process and the hotter the temperature during smoking, the drier the hams become and the better their keeping qualities. A recent development in curing is artery pumping, that is, pumping pickle is forced into all parts of the ham through blood channels. With artery pumping more pickle is introduced and retained in the ham. Because of their higher moisture content, such hams do not keep as satisfactorily as those cured by other methods. Practically all smoked hams produced in official establishments are now artery pumped. Under-dried hams are apt to mold. Commercially smoked hams are not designed for long keeping. They should be consumed within 2 weeks after smoking for best results. Army commissaries and messes should not stock smoked hams for more than a maximum of 1 month; 2 weeks would be safer.

(f) *Overseas shipments*.—Hams prepared for overseas shipments by heavier smoking have better keeping qualities. For shipment to the tropics many are wrapped in an asphaltum covering which excludes air, moisture, and light. Those packed in asphaltum coverings receive a hard cure and a heavy smoke. They keep well for months with very little mold growth because of the small amount of air present. Army hams are sometimes packed in airtight, hardwood quarter or half barrels. They are packed naked and all spaces around the hams are filled with dry salt. At time of packing the salt is practically free of moisture but it rapidly draws moisture from the meat and becomes moist. If such packages are allowed to remain in one position for a month or two the salt in the bottom becomes wet. Hams packed in salt lose weight, and also absorb salt and become salty in taste. The smoked color is bleached by the salt and they become pale in appearance. Those in contact with wet salt become soft and flaccid. Such hams are not ordinarily transported and held

under refrigeration. Salt prevents surface mold but it does not prevent internal souring.

(3) *Bacon.*—(a) *General.*—Clear bellies are free of bones. However, the cartilages (featherbones) embedded in meat at the ends of the floating ribs are not bones and are not removed. Bacon bellies cannot be rejected because of presence of featherbones. Good quality is indicated by soft, smooth, thin skin, firm white fat, and firm meat of lively color and fine texture. After smoking the skin is no longer soft and flexible but should be thin and smooth, and good qualities of fat and meat should be evident. Thick, rough, wrinkled skin; soft, oily fat of brownish color; and soft, oily meat of dull color or coarse, dark-colored meat indicate poor quality, and bacon with such characteristics should be excluded from deliveries.

(b) *Trim and cut.*—Trimming varies with the grade, being greatest in Type I, grade 1. The extent of trimming is illustrated in figures 6 to 11, inclusive. In commercial practice the shoulder is cut from the side immediately behind the elbow joint. The skin at this point is soft and contracts considerably during the smoking process. The brisket is the forward part of the belly, and extends as far back as there is evidence of soft tissues behind the elbow. Type I, grade 1 bacon should have the brisket completely removed (see fig. 8). It is not necessary to remove the brisket from Type II (dry salt-cured). Type I, both grade 1 and grade 2, must be seedless. In commercial practice the belly edge of both barrow and gilt is cut back close to or beyond the line of nipples to insure removal of all seeds (see figs. 8 and 9). Barrow bellies for Type II (dry salt-cured) bacon are not cut back to remove the nipples but gilt or sow bellies must be cut back to insure that they are seedless (see figs. 10 and 11). All bacon delivered under Federal specifications must be square-cut which requires removal of the "bootjack" and the "backstrap" (see figs. 6 to 11). In cutting pork middles a scribe saw is used to separate spare-ribs from loins. At times this scribbling cut may be so deep as to mutilate tissues underneath. After loin and spareribs have been removed from the middle, the fat back is severed from the clear belly on a line from $\frac{1}{2}$ inch to 2 inches beyond the scribbling cut, leaving any mutilated tissues on the belly. Bellies should be properly trimmed or backstrapped to remove any evidence of such injuries. If not they should be rejected. Backstrapping consists of removing the strip of fat and skin along the fat back edge of the belly to make it square cut.

(c) *Quality.*—Bacon bellies of good quality have thickness proportionate to their length and width. Abnormally thin bellies usually

are not good quality and are placed in lower types and grades of bacon. Trimming for Type I bacon reduces length and width but not thickness. However, since such bacon is made largely from bacon type hogs, thickness is usually not out of proportion to width and length. Proportions of lean and fat vary with sex and extent of trimming. Barrows have an extra streak of lean in the belly edge. The greatest amount of lean is in the belly edge; there is none in the fat back edge. When the belly edge is trimmed back to make seedless a large percentage of the lean is removed. Such bellies should not be rejected. If cut too wide and include too much fat back the proportion of lean is greatly reduced and such bellies should be rejected. Barrows used in Type II bacon contain the highest percentage of lean. When cut very close to the shoulder and the brisket is allowed to remain on, a rather large area of lean may appear in the brisket end. This should not be construed to comply with the requirement "well streaked with lean."

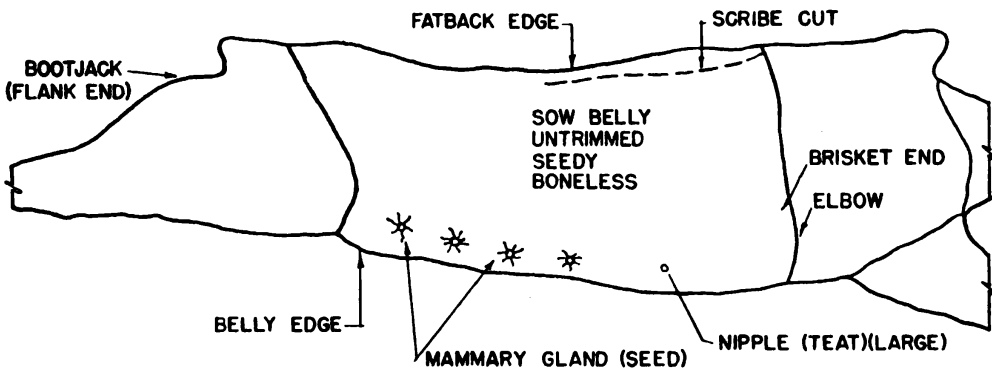


FIGURE 6.

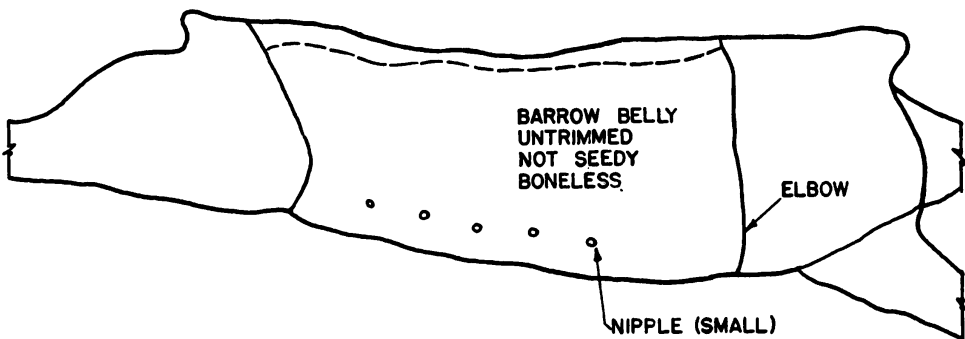


FIGURE 7.

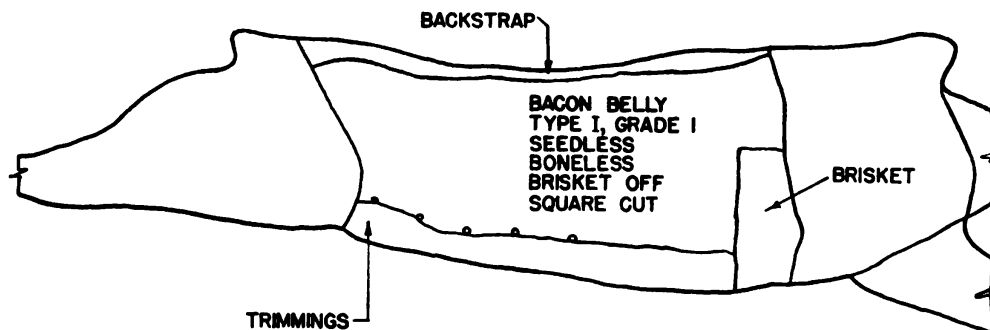


FIGURE 8.—Cut for Type I, grade 1, bacon.

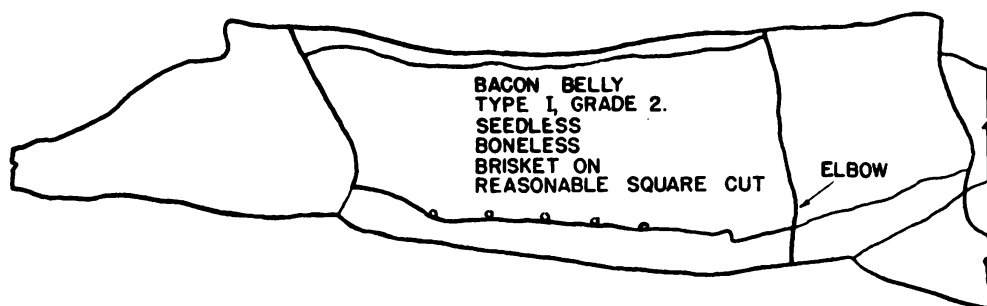


FIGURE 9.—Cut for Type I, grade 2, bacon.

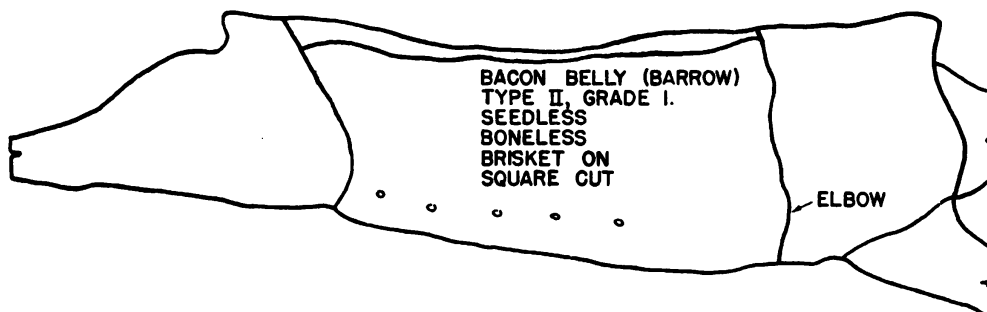


FIGURE 10.—Barrow belly cut for Type II, grade I, bacon.

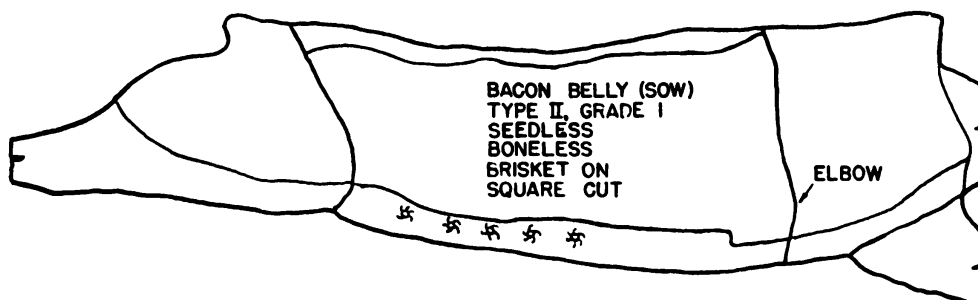


FIGURE 11.—Sow belly cut for Type II, grade 1, bacon.

(d) *Cure*.—In dry-sugar box cure no pickle or other moisture is applied to the meat. The meat comes out of cure at about green weight, having absorbed about the same weight of curing agents as the loss in moisture. When properly smoked Type I bacon should be firm and dry. Proper smoking is indicated by a golden brown or cherry color and firm, dry skin, meat, and fat. Bacon with soft, flaccid skin and pale color and that bends easily is usually undersmoked or is inferior quality, or has not been properly dry-sugar box-cured. Type II, dry-salt cured bacon loses about 3 percent in cure and from 9 to 12 percent additional smoke. Such bacon is very dry and firm.

(e) *Storage*.—Keeping qualities of bacon vary with kind of cure and degree of drying during smoking. Commercially smoked dry-box cured bacon is not designed for long storage, but should be consumed if possible within 2 weeks. Army organizations should not stock such bacon beyond a maximum of 1 month; 2 weeks would be safer. Bacon smoked for 48 hours has much better keeping qualities. Type II, dry-salt cured bacon has excellent keeping qualities and will remain in good condition for 6 months or longer when packed in crates, and from 1 to 2 years in cans. Sliced bacon, because of the much greater exposure to air, has lessened keeping qualities. Bacon fat becomes yellow with age due to oxidation and disintegration of the fat, and acquires an acrid (acid) flavor.

(f) *Condition*.—Bruises are sometimes difficult to detect in fresh bellies but become very prominent after smoking due to dark discoloration of blood in the bruised area. Bruised bacon bellies should be rejected. Trier inspection of bacon bellies should be along the line of featherbones and in the brisket end. Type II bacon which is hung for smoking by means of strings through the flank end sometimes shows sourness in and around the string holes. Sourness is much more prevalent when hung by the brisket end. Mold on bacon is of little importance unless it penetrates beneath the surface in crevices or torn places. However, bacon that is moldy at delivery time should be rejected since it is evidence of age or improper handling. Bacon kept where air can circulate freely about each piece does not mold appreciably, but it will shrink in weight.

(g) *Style*.—Canadian style bacon is made from the eye of heavy loins with a thin layer of fat from fat back attached, and is very lean. It is dry-cured, and usually smoked in stockinettes or artificial casings. Briskets are dry-cured and smoked on wire screens. They present a higher proportion of lean than bacon bellies, and when cut sufficiently wide are desirable. They are cut in varying widths from 2 to 5 inches. Squares are cut from the jowl, and are cured in dry

cure or dry-salt cure, and are smoked in the same way as briskets. They contain very little lean meat and are not desirable as breakfast bacon.

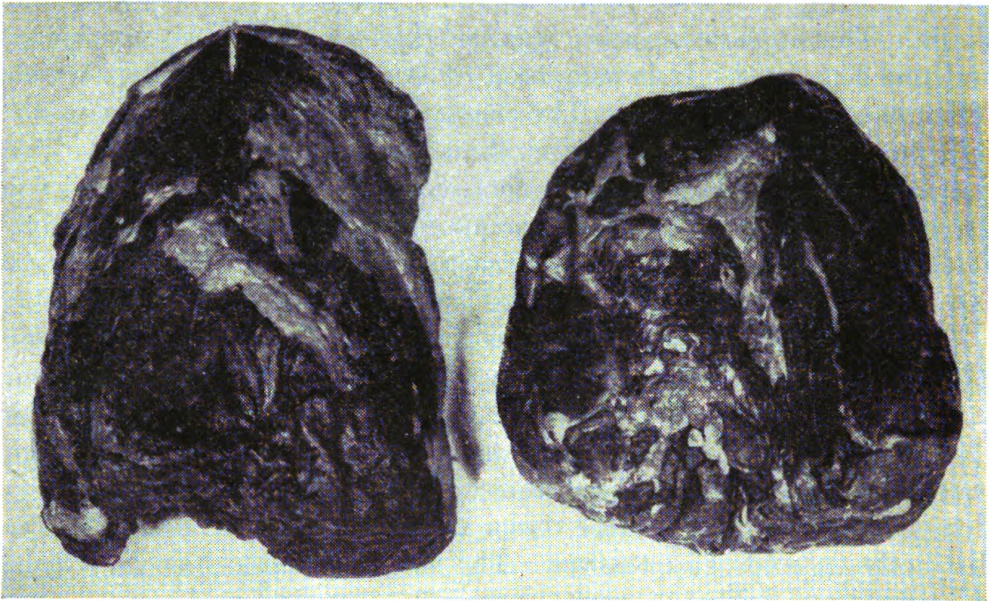
(4) *Beef, dried.*—(a) *Cuts.*—Dried beef is made from the three divisions of the round, inside, outside, and knuckle (beef hams). The inspector should be able to identify cuts as well as slices made from them. The inside is the largest of the three cuts and is composed of one group of muscles of the same color and texture. Naturally, the inside terminates at the shank and in a triangular point, but commercial practice now molds the inside into a more compact form (see fig. 12) that results in more slices of uniform size and shape. The outside is much smaller than the inside, is narrower, and much thinner. It is composed of two groups of muscles which differ in color and texture. The shank end of the outside terminates in a more acute triangular point than the inside (see fig. 13). The knuckle is shaped like a mule's foot, compact and rounded, and the group of muscles of which it is composed is divided into three divisions of about equal size. The knuckle bone (patella) is present in the small end of commercially dried knuckles (see fig. 14).

(b) *Slices.*—Sliced dried beef is just as distinctive as the cuts. Slices from the inside are large, oval in form, of uniform color and texture throughout. Very delicate connective tissue may divide the slice into two or three indistinct sections (see fig. 12). Slices from outsides are narrow and long, and are divided into two distinct sections by a layer of connective tissue and fat. The two sections differ distinctly in color and texture. The smaller section has very light color and fine, delicate texture and gives appearance of having been sliced across the grain, while the larger section is much darker in color, has a coarser texture, and gives appearance of having been sliced with the grain (see fig. 13). Slices from knuckles are rounded or roughly triangular in outline and are divided into three almost equal parts by two layers of connective tissue, all sections having the same color and texture (see fig. 14). Knuckles are darker in color than insides, much darker than the light colored end of outsides and about the same color as the darker end of outsides. The cut surface is frequently phosphorescent.

(c) *Quality.*—Dried beef is made from canner and cutter grades of cows and from low grade bulls. Very dark meat indicates bull meat. The meat is hard cured, and dried for a period of from 4 to 7 days. Smoking is no longer commercially practiced. The beef loses from 35 to 45 percent of its weight in drying process. Dried beef cuts (unsliced) should be firm and dry, and have a bright mahogany

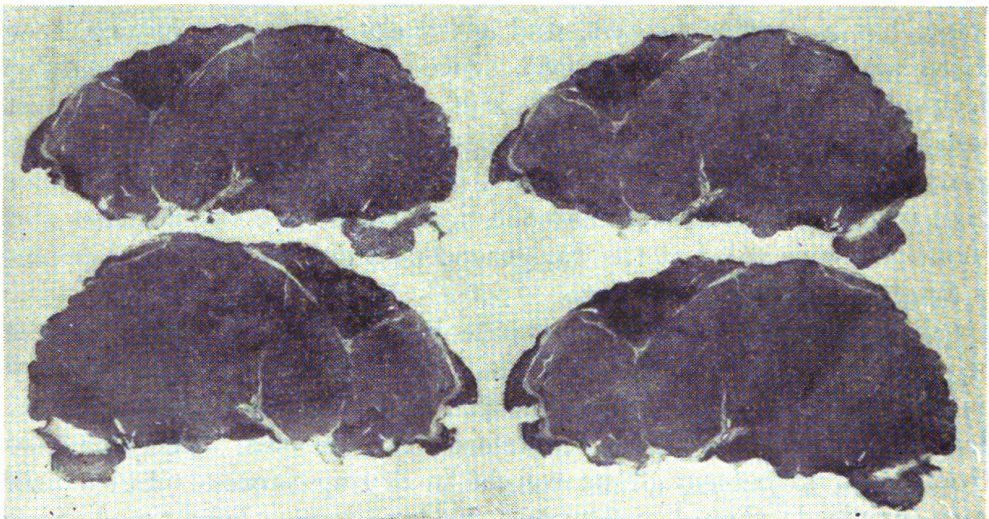
or cherry color. A dry, lifeless ("perished") surface appearance (particularly outsides) indicates poor quality. While presence of fat indicates better quality, fat is undesirable since it deteriorates rapidly. Surface fat and fat in grooves between muscle bundles should be trimmed away before delivery.

(d) *Storage*.—Dried beef hams can be kept for a considerable time, but are best when sliced and used within a month or two. Sliced dried beef has limited keeping qualities. Packed in boxes or cellophane-wrapped, it keeps well for 2 to 4 weeks. Packed under high vacuum in hermetically sealed glass or tin containers, it keeps well



①Not molded.

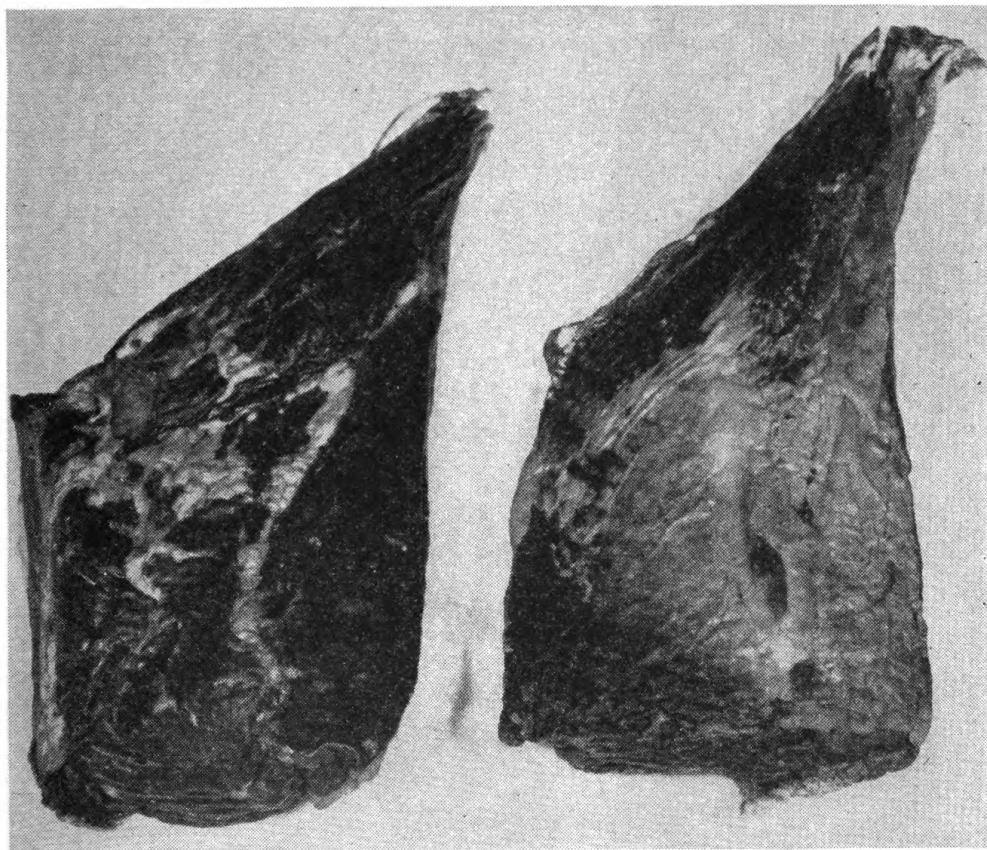
②Molded.



③Slices.

FIGURE 12.—Dried beef insides.

for several months. However, all sliced beef acquires an old flavor with age, and in sealed containers may be edible after a year but not palatable.



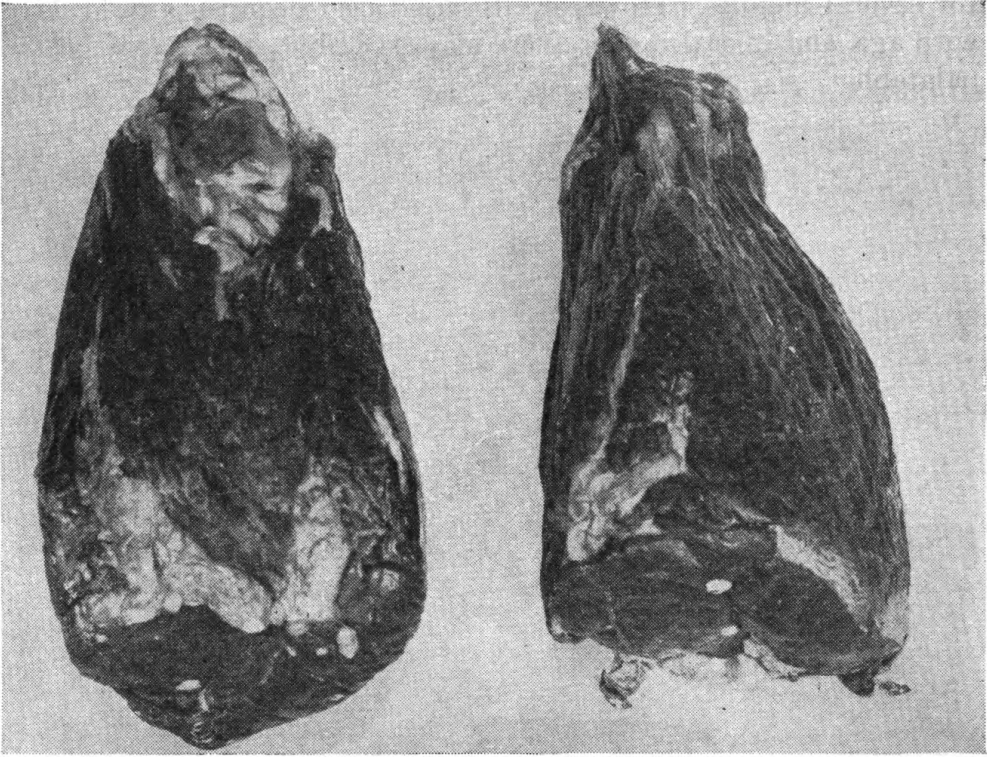
① Inside view.

② Outside view.

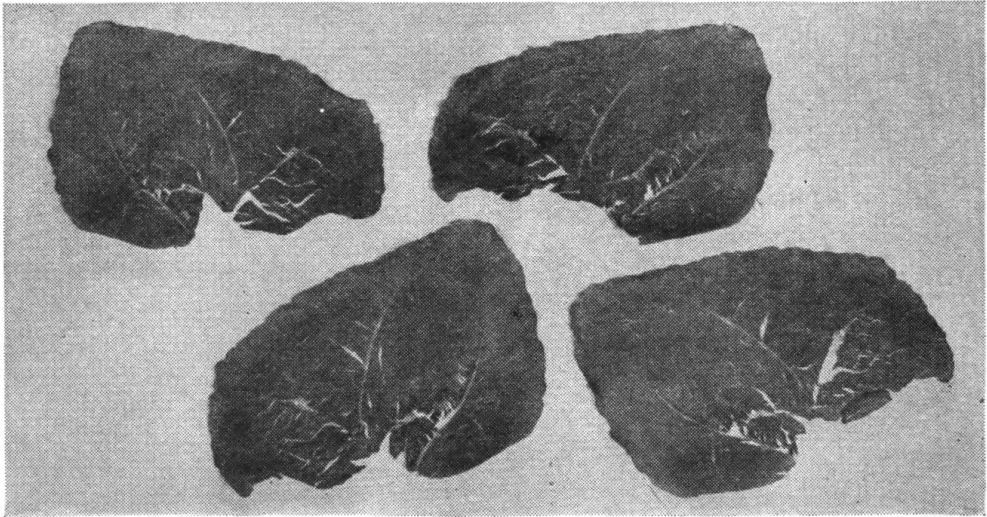


③ Slices.

FIGURE 13.—Dried beef outsides.



① Knuckles.



② Slices.

FIGURE 14.—Dried beef knuckles.

82. Sausage.—*a. General.*—Federal specifications prescribe ingredients and proportions thereof that enter into manufacture of various kinds of sausage for Army use. The only way these can be assured is by inspection at time of manufacture. In finely chopped sausage especially it is impossible to determine accurately by physi-

cal inspection quality and proportions of materials used. Inspection at delivery point should include net weight, kind of casings, number of links to the pound, condition, and if not inspected at origin, quality.

(1) *Net weight*.—Net weight should be exclusive of wrappings. Dry sausage is not apt to shrink after it is packaged for shipping but fresh and smoked may shrink if exposed to warm temperatures and moving air.

(2) *Casings and links*.—Casings are either natural or artificial. Natural casings are derived from animal tissues (intestines, etc.) and are digestible, while artificial casings are made of cellulose and are not digestible. Artificial casings are made in sizes to resemble natural, are usually transparent, and have a glossy appearance. Natural casings are duller in appearance and vary from near transparency to opaque. Pork sausage in casings and frankfurter style are linked, size and length of links varying with size of casings. Since these products are consumed largely by number rather than by weight, the number of links per pound is important.

(3) *Condition*.—Condition of sausage is important, particularly in fresh, smoked, and cooked type, and refers to deteriorations due to growth of bacteria and molds resulting from contaminated materials, too high temperature and humidity, too long storage, etc. Three conditions in particular that the inspector should observe are external slime, external mold, and internal greening.

(a) External slime results from bacterial growth. Slimy sausage when offered for delivery should never be accepted because it indicates faulty handling. Slime may at first be colorless but in later stages may turn gray or faintly green. When confined to surface of sausage in casings, slime can be removed by washing and gentle scrubbing. Usually the sausage inside is sound, but very slimy sausage ordinarily should not be used.

(b) External mold is common on dry sausage (cervelat, etc.), but is undesirable on other types. Its presence indicates contamination with mold spores and storage at too high a temperature, in too high humidity, and with too little circulation of air. Fresh, smoked, and cooked sausage delivered in moldy condition should be rejected. When held a few days in a mess icebox, these types may acquire a growth of mold. This mold is harmless and can be easily washed away if confined to the casing. Mold that penetrates through breaks in the casing may impart a moldy flavor but it is not injurious to health.

(c) Internal greening is caused by bacterial growth. The green areas may be in rings or in spots, in outer layers, or in the center. To detect internal greening the sausage should be cut across its long axis with a sharp knife. Any showing green areas should be rejected upon delivery and should not be eaten. Gray rings found beneath the casing in the outer layers differ from greening in that they are usually caused by abrupt temperature changes during manufacturing processes. They are harmless but detract from appearance.

All sausage should be clean. Contamination with dirt, filth, insects, rodents, etc., is inexcusable. Sausage should not be cut until all surface slime, mold, or dirt has been removed. A sharp thin knife should be used, and cut surface should be uniform in appearance throughout. The inspector should be familiar with factors that stand for good condition in the various kinds, and any deviation from any appearance of freshness, bright color, and fresh odor typical of the variety is sufficient ground for rejection.

(4) *Quality*.—Quality is indicated by the appearance and feel, and more particularly by appearance and texture of cut surface. Use of fresh meats produces sausage of bright color while stale meats result in dull, lifeless color. Fresh meats have good binding power and cut surface of such sausage is cohesive and continuous, while that made from stale meats and from offal (tripe, etc.) is not cohesive but crumbles easily. Appearance of the cut surface reflects proper or improper methods of chopping and stuffing the meat. Dull knives shred meat instead of cutting it; imperfect removal of sinew and gristle is indicated by presence of small pieces of gristle or connective tissue on cut surface; excessive use of water may result in soft texture or excessive shrinkage and shriveling in smoked and cooked; stuffing too loosely results in air pockets; all of which are undesirable.

b. Pork.—There is no standard of fineness for pork sausage. It is made commercially by grinding or chopping and may be coarse or fine. Specifications require use of trimmings with not more than 40 percent trimmable fat. The only way this may be determined is by testing the meat before it is ground. Trimmable fat is fat that can be removed by careful hand-trimming. However, pork muscle usually contains varying percentages of fat so that laboratory determination of fat in the finished sausage is not indicative of trimmable fat in pork trimmings used. The specification as amended permits a maximum of 45 percent fat in the finished product. Pork sausage should have sufficient fat to make it juicy and palatable but not be too wasteful when fried. It should have

a bright color, a dull color and crumbly texture indicating stale or frozen trimmings. It is packed in bulk in cartons and in tin containers, and should be packed as compactly as possible to reduce area exposed to air. It is also made in the form of patties and in bricks or bars that may be cut to suit individual taste. These are protected from air by waxed paper wrappings or paper-lined cartons. It is stuffed in either hog or sheep casings. Hog casings are much wider than sheep, and links are shorter than sheep. Unless frozen, it has very limited keeping qualities and should be kept under refrigeration constantly until cooked. It should be consumed within 24 hours after received, and should be received in a thoroughly chilled, dry state. It soon loses its bloom and acquires an acrid flavor due to deterioration of fat and liberation of fatty acids. Frozen pork sausage should not be defrosted until ready for use. Except the canned product, it is always delivered in an uncooked state.

c. Bologna style.—Bologna sausage is a finely chopped product stuffed into casings, smoked, and cooked. The commercial product may contain cubes of pork fat, cheek meat and meat products, and be stuffed in beef middles, beef bungs, weasands, or artificial casings. Under Federal specifications only pork and beef trimmings are allowed, and the sausage is stuffed into beef middles. Commercially, beef middles may be single or sewed. Single casings vary from 1½ to 2½ inches in diameter, while sewed casings vary from 2½ to 4½ inches in diameter. Middles are usually cut 18 to 20 inches in length. Artificial casings may be of any desired diameter. Bologna offered for delivery should be free of slime or mold, have a bright smoked appearance, and the casing be plump, full, and free from breaks. The cut surface should have uniform pinkish-red color and fine texture free from air pockets and coarse pieces, or pieces of gristle or coarse connective tissue. Nonuniform or faded color, green rings or green centers, and soft, friable texture is cause for rejection. It has better keeping qualities than fresh pork sausage, but requires refrigeration and should not be stored for more than a week unless frozen.

d. Frankfurter style. This is another smoked and cooked sausage made from finely chopped meat, and stuffed into hog or sheep rounds or artificial casings. Hog casings are tougher than sheep which run approximately ⅔ of an inch to 1 inch in diameter; hog from 1 to 1⅔ inches in diameter. Artificial casings are usually of one size approximating medium or wide sheep casings. Length of links should vary with size of casings. Bureau of Animal Industry regulations permit

artificial coloring but it must be confined to the casing. However, Federal specifications prohibit delivery of artificially colored sausage. Frankfurter style offered for delivery should be in clean, sound packages, be dry and clean, free from mold and slime, and have a bright, smoked appearance. Broken casings are undesirable. Links should be full, plump, firm, and not wrinkled. Internal condition and quality is best ascertained by breaking a link across the long diameter and by cutting it lengthwise with a sharp knife. The meat should be very finely chopped, be free from coarse pieces and pieces of gristle or coarse connective tissue, be juicy without being watery, cohesive, and have a uniform pinkish-red color throughout. Crumbly or very friable meat indicates use of stale or frozen meat or offal. Links should withstand considerable bending without breaking, and when broken across the surface should be rugged but cohesive, and not crumbly. Faded areas or discolored rings, spots, or centers, and large air pockets are undesirable and sausage showing such defects should be rejected. Frankfurter style has approximately the same keeping qualities as bologna. It should be under refrigeration until used. The fresh product should not be stored for more than a week without being frozen. Sausage in cartons kept in an ordinary icebox is almost sure to become slimy or moldy within a week.

e. Liver sausage.—Liver sausage is cooked, finely chopped, and stuffed in hog bungs or other casings of animal origin. Braunschweiger is smoked liver sausage and is almost invariably stuffed in hog bungs. Artificial coloring is not permitted under specifications. Fresh liver sausage is highly perishable and suffers considerable fading and discoloration when held. It should have a clean, bright exterior, and cut surface should present a bright, uniform, grayish-pink color. When exposed to air the cut surface rapidly becomes a dull gray. Braunschweiger has a smoked appearance externally and a higher meat color. A dull, lifeless color indicates staleness and such should be rejected when offered for delivery. A faded ring just inside the casing soon develops when liver sausage is held for a short time, and it should be ordered for delivery only for immediate use. It should not be stored for more than a few days. Federal specifications prescribe delivery in hog bungs, beef rounds, or beef middles. Hog bungs are about 30 inches in length and vary considerably in size. They are largest near the crown end and gradually taper to the small end. Size is designated by the diameter about 18 inches from the crown. They may be either whole (unsewed) or sewed. Whole bungs run from 1 to over 2 inches in diameter and hold from 1½ to 4½ pounds. Sewed bungs run from 2½ to over 3 inches in diameter and hold from

5 to 7 pounds. Beef middles are 18 to 20 inches long. Single (whole) middles run from $1\frac{1}{2}$ to $2\frac{1}{2}$ inches in diameter, sewed run from $2\frac{1}{2}$ to $4\frac{1}{2}$ inches in diameter and may be cut in any desired length. Beef rounds are always single (not sewed).

f. Cervelat.—Cervelat is a dry sausage. The meat is chopped fine, stuffed in hog bungs or beef middles, and smoked. Some soft forms are also stuffed in artificial casings. It does not contain garlic. There are two distinct types, dry and soft. Dry cervelat is air-dried for 60 to 90 days; is firm and dry, and is not cooked. Gothaer is a high-grade dry cervelat. Other dry cervelat is put out under brand names. Soft cervelat is not air-dried but is smoked at a temperature that cooks the meat. It is sold as fresh summer sausage. Thuringer is a soft type. Dry cervelat has excellent keeping qualities. It does not need refrigeration, but should not be exposed to high temperatures. It will keep for months if properly cared for. Soft cervelat and all other varieties of soft summer sausage have limited keeping qualities. They may be kept for 1 or 2 weeks under refrigeration, but because of higher moisture content are apt to mold. Federal specifications stipulate that the *dry* sausage be delivered which excludes Thuringer and other soft forms. During the long drying period dry sausage usually becomes moldy. Before shipment this mold is washed off. A slight growth of fine mold that can be washed off on the surface at delivery time is of little importance. However, wet or slimy or very moldy sausage should not be accepted. Casings should be unbroken. The cut surface should be firm and of a bright color. Federal specifications permit delivery in hog bungs only.

83. Lard and lard substitutes.—*a. Lard.*—Lard is rendered hog fat. Two types are purchased. Type I, open kettle-rendered, has dark cast, grainy appearance, and aroma is that of fresh pork frying in an open pan. The dark cast is that of unbleached lard, and the grainy appearance results from slow chilling without agitation. Any lard may be made smooth (not grainy) by agitation during chilling or by very rapid chilling. Because it is made of the hardest hog fats, it has a higher melting point than refined steam lard. Open kettle-rendered lard should have characteristic color, appearance (grain), and aroma of this type, be free from any rancidity or foreign odor, and texture should be firm but somewhat crumbly, but not sticky. Type II, refined steam lard is rendered from less hard fats under steam pressure and in presence of moisture; it is bleached and chilled quickly under agitation. Refined steam lard is slightly less hard than open kettle-rendered, is smooth (without

grain), has a bluish-white color and an aroma similar to that of pork cooked in water. Refined steam-rendered lard is usually marketed under the name of "pure" while Type I is usually designated "open kettle-rendered" though both are equally pure. Refined steam lard should have characteristic appearance and aroma of this type and be free from any sour, rancid, or off-odor, and should not be sticky or gummy. Good steam-rendered lard can be made only from fresh hog fat. Use of pickled fats gives dark color, off-odor, and less desirable texture. Texture is ascertained by pressure with the finger. While degree of resistance to pressure will vary with temperature, lard should be plastic and flow away smoothly from the finger on pressure. When the finger is removed it should not stick but fall away cleanly. Inspection should be made at room temperature. Aroma should always be determined in still air since a draft may carry away the odor. If any doubt exists concerning aroma, product should be heated. Color of the melted lard can be ascertained best in a clear glass bottle by holding the bottle of melted lard up to the light. Lard has a much greater range of plasticity than lard substitutes; that is, it remains in a firm or plastic state without melting over a greater range of temperature than do substitutes. Free fatty acids are easily ascertained by a simple laboratory test, and the content should not exceed 1 percent. In good, fresh lard it is much less than that. Lard is a perishable product, deteriorating rapidly in warm temperatures, in direct sunshine, and in presence of moisture and air. Therefore it should be stored at temperatures near 40° F. in opaque containers, and shielded from air and moisture by protective paper wrappings or in tight containers. Repeated warming and chilling make it deteriorate rapidly. At a constant temperature of 40° F. and in protective containers, good lard will keep for months. It is produced whenever hog fat is available for rendering.

b. Substitutes.—Lard substitutes are made from animal and vegetable fats or from vegetable fats alone. They are made to resemble lard in consistency and appearance and are used for the same purposes. However, they differ from lard in color, texture, aroma, and plasticity range. Type II which contains oleo stearine has a somewhat yellowish or creamy-white cast, Type I a white to creamy-white color. None resembles closely the dull white to bluish-white color of lard. When properly chilled, substitutes are more brittle than lard; under pressure by the finger the product does not flow away smoothly. In aroma they are very bland or odorless, and lack the outstanding and characteristic lard aroma. If chilled too much they are not worked easily, and when warmed they soften up

and become oily much more rapidly, and their plastic and workable range is much shorter than that of lard. Lard substitute should have characteristic color and texture of the type to which it belongs. Aroma should be bland and free from rancidity or foreign odor. Hydrogenated substitutes have excellent keeping qualities. Some keep well even without refrigeration. Type II substitutes require the same degree of care and refrigeration as does lard. A transparent or translucent appearance of either lard or lard substitute is evidence of breaking down of fat, liberation of fatty acids, and rancidity. Such lard or lard substitute is inedible.

84. Canned meats.—Inspection of canned meats for quality of materials and percentage of ingredients used must be made before and at canning time. Reinspection at delivery point or in storage includes packaging, condition and soundness of containers, condition and, in some instances, quality of can contents.

a. Packages.—For use within the continental limits of the United States cases are made almost entirely of corrugated fiber board. For oversea shipments wooden boxes either of veneer or sawed construction are used because of their greater stability. When delivered or when stored, cases should be sound, clean, and unbroken. Broken cases indicate rough handling. Because of means used in loading and unloading vessels, cases of meats shipped overseas are frequently broken. All broken cases should be opened and condition of cans noted. Rarely can much damage be done to cases without some damage to cans also. All cans should be removed from broken cases and carefully inspected. Cases containing broken or leaky cans should never be placed in storage. All broken cans should be removed and disposed of. Any cans stained or smeared by contents of broken cans should be cleaned, and if necessary, relacquered before placed in stock.

b. Containers.—(1) *Condition.*—Cans should be inspected for cleanliness, lacquer coating or label, and soundness. They should be free from dirt and grease. Practically all meat contains fat and in the packing process some grease is almost sure to be smeared upon surface of cans. Greasy cans are unpleasant to handle. In commercial practice such cans are washed in an alkali bath, and those so treated show some mottling of the tin. Unless this has progressed too far it is of little importance, and is not evident after the cans are lacquered. If grease is not removed, lacquer does not adhere. Canned meats designed for oversea shipments are invariably given an outer coating of lacquer to protect the tin against rust. Lacquer should be evenly applied and completely cover the can. It should be

of sufficient flexibility and tenacity that it will not chip or break when the cans are handled. Inspection should ascertain that cans are lacquered properly. Cans protected by labels should have the labels neatly and securely attached. They should bear true name of product, net weight, name of canner, inspection legend, and establishment number. All meat cans prepared under Army inspection also bear month and year of canning. The above data may appear upon the label, but establishment number and date of packing are usually embossed in the tin of the can top. Products packed under inspection usually have all pertinent data embossed in the tin either in the body or the cap of the can, and no label is used.

(2) *Soundness*.—Soundness of cans is ascertained by touch or by percussion. For the inexperienced inspector the former method is recommended. In inspecting cans by this method they are taken in the hands one by one and felt for loose tin or convex surfaces. All meats are canned under vacuum and ends of round and all six surfaces of pyramidal or square cans should be concave and closely contact the product within. Any loosening of tin on any surface that should be concave can be detected readily by touch. Slightly loosened tin may be indicative of low vacuum, but ordinarily convex surfaces or loose tin indicates leaky cans or development of gas within the can. There are two exceptions to this general rule. Cans packed at low altitude may show loose tin when taken to high altitude because of decreased external air pressure. When cans are filled by power stuffers such as are used in canning corned beef, the pressure exerted within the can by the plunger sometimes forces the bottom of the tin into a convex shape that does not become concave even under vacuum. If doubt exists as to can soundness under either of these conditions a few should be incubated at a temperature between 90° and 100° F. for 10 days. If sound they will remain in their original state, but if leaky or not sterile, fermentation and swelling will ensue. A little practice will enable the inspector to differentiate between sound and unsound cans. In the percussion method, cans are struck on the flat surface, particularly the ends, with a metal rod or wooden stick. Sound cans with proper vacuum give an unmistakable tense sound when struck. Leaky cans, short vacuum cans, springers, flippers, and swells give forth an entirely different sound. However, considerable experience is necessary to be able to differentiate between the various sounds. Inspection by touch is less rapid but more accurate. If doubt exists as to can soundness, it is best to err on the safety side. No cans with loose or distended tin should be passed for food unless proved sound by incubation or otherwise.

(3) *Contents*.—Products which are to be sliced and eaten cold such as corned beef, ox tongue, etc., should be chilled before opening for inspection. Others should be at room temperature. Inspection should be made if possible in natural light away from drafts, and in air free from foreign odors. A vacuum gage to determine extent of vacuum may be used but is not essential. If all flat surfaces are concave and closely contacting contents, the number of inches of vacuum is of little importance. Vacuum varies greatly in different products. Sliced dried beef in glass is usually sealed in about 28 inches of vacuum, while Army Type II bacon in 12-pound cans is sealed in about 15 inches of vacuum. In the latter case a greater vacuum would result in buckling. Altitude also affects vacuum registered on a vacuum gage.

Some cans are provided with key-opening bands, and when present, should be opened by this means. Others are opened by means of a can opener by cutting around edge of the cap. For pyramidal and conical cans, the large end should be removed. The end should be removed as smoothly as possible to allow easy removal of contents, especially on products such as ox tongue which should be retained whole. As soon as the cap is removed aroma of contents should be noted. It should be typical of the product and free from any sour rancid, or foreign odors. Containers are designed to hold definite weights of various products, and trade practice has established desired fill. They are filled as full as compactness of the product and drawing of proper vacuum will permit. Under-filled cans are undesirable. Color, texture, compactness, quantities of gelatin or moisture, and flavor should be typical of the product being inspected. Canned meats that have been stored several months may show iron sulphide discoloration. This is practically always confined to the surface and can be scraped or trimmed off. Army canned meats in storage for a considerable length of time should not be condemned for iron sulphide discoloration, but those showing this defect on delivery should be rejected. Use of enamel-lined cans eliminates this defect.

c. *Storage*.—Canned meats have excellent keeping qualities, and do not require refrigeration. With the exception of sliced dried beef and sliced bacon, those purchased for Army use will keep well for a year or more. Canned corned beef has been known to remain in excellent condition for more than 10 years. They should be stored, if possible, in dry storage at a temperature not over 70° F. Temperatures below 60° F. enhance keeping qualities while temperatures above 90° F. lessen storage life.

SECTION XII

DAIRY PRODUCTS

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85. General.—*a.* Inspection of dairies, creameries, and cheese factories, and of fresh, malted, condensed, evaporated, and dry powdered milk, butter, cheese, and ice cream is a function of the Veterinary Corps of the Medical Department. The following publications embody the customary procedure in dairy products inspection and standards:

- (1) Military Meat and Dairy Hygiene, Eakins.
- (2) Subsistence Bulletin No. 14—Dairy Products.
- (3) United States Department of Agriculture Revised Tentative United States Standards for Quality of Creamery Butter.
- (4) United States Public Health Service Milk Ordinance and Code.

b. The prescribed examination and testing of herds which are the source of military fresh milk supply can be conducted only by accredited or authorized veterinarians. Cattle testing and dairy inspection procedure is described in *a* (1) above. Pasteurization procedure is described in *a* (2) above. Pasteurization of milk can be ascertained only at the pasteurization plant by observation of time and temperatures. No laboratory test of milk after pasteurization provides an accurate determination of correct pasteurization. Bacteriological, Babcock (butterfat), lactometer (to determine total milk solids), sedimentation (to determine gross dirt), acidity, and other laboratory tests are described in *b* above. These tests require equipment seldom found except in laboratories equipped for testing dairy products. However, there are other tests that can be made without use of laboratory equipment.

86. Milk.—*a. Fresh.*—(1) *Containers.*—Fresh milk for Army use is delivered in glass bottles or fiber containers. Glass bottles are easily inspected for dirt, extent of cream line, and color of the milk. Bottles should be scrupulously clean showing no sediment in the bottom, and be sound without any broken or chipped edges, especially around the mouth. Broken glass is dangerous and is difficult to clean. Color of milk varies with breed of cattle and nature of feed. Jersey and Guernsey cattle produce milk of deeper yellow color than other breeds. Green and succulent feeds produce milk of deeper yellow color than dry feeds. Therefore, milk usually has

a deeper yellow color during spring and early summer. The cream line is a fairly accurate indication of butterfat content but it is influenced by pasteurization. Cream line, color, and gross dirt in milk are not readily ascertained in fiber containers. Milk bottles and fiber containers should be closed with clean stoppers which show day milk was bottled or delivered. Certified milk bottles have hooded caps which are printed to show name of product, name of producer, and license number under which producer operates.

(2) *Quality*.—In consistency milk should pour smoothly and evenly from the container. Any stringiness observed on pouring should be grounds for rejection. Colostrum in milk is readily detected by boiling a small quantity. If colostrum is present it will curdle. Milk should have a sweet, pleasant aroma and flavor. During spring months garlic odor and flavor is frequently present, and such milk should be rejected. It should have a temperature not above 50° F. when delivered. Higher temperatures indicate improper handling and such milk should be rejected.

(3) *Storage*.—Milk should be stored under refrigeration. Fresh, clean milk will keep for several days without spoiling, but for Army use it should not be stored for periods longer than 36 hours.

b. Evaporated.—Inspection of evaporated milk should include inspection for consistency, flavor, color, separation, grainy sediment, and curdy, curdled, and fermented milk.

(1) *Consistency*.—In consistency evaporated milk is much denser and more viscous than fresh, but should be entirely fluid, even and smooth, and not show any curd specks. The latter are tested by means of a spoon which is dipped into the milk and gently raised above the surface with the convex surface of the bowl of the spoon upward. The milk should flow off the spoon without leaving any curd specks. Another method consists in tilting the opened can until the milk just touches the edge of the can opening. By inserting the spoon on its edge and slowly raising the bowl keeping the spoon handle in touch with the milk, a film of milk is drawn up in the triangle between spoon bowl, spoon handle, and surface of the milk. This film should not show any curd specks.

(2) *Flavor*.—Flavor should be clean and free from any disagreeable or foreign flavors. It differs greatly from that of sweet milk because of sterilizing process to which it is subjected. The inspector should be familiar with the normal flavor of evaporated milk in order to ascertain presence of off-flavors.

(3) *Color*.—Color varies with desire of individual manufacturer. Some brands are almost as white as fresh milk, but most evaporated

is much browner. Some manufacturers believe that the latter has a richer, more cream-like appearance. Unless very brown, in which instance it is apt to have a high cooked or burnt flavor, no distinction should be made between brands of different color.

(4) *Separation*.—The chief defect is cream separation or creaming, resulting from long standing in one position. The butterfat gradually separates and is forced to the top by the heavier, denser milk serum, and may adhere to top and side of the can. Cans which stand still in one position for several months are bound to show some separation. If extensive, it may interfere with pouring from the can. However, such milk is usually sound and its food value is not altered. It can be used for cooking purposes about as well as the unseparated product, but not as well in coffee or on cereals. Evaporated milk showing this defect upon delivery should be rejected. When the condition is found upon reinspection in storage, it should not be condemned.

(5) *Grainy sediment*.—Grainy sediment is found frequently and appears as small, rough, very hard granules, sometimes loose and sometimes adhering to the bottom of the can. If incorporated in food they are unpleasant when bitten but otherwise are of no importance. Grainy sediment is undesirable, and lots showing a considerable number of cans with this defect upon delivery should be rejected. When found in cans in storage, such lots should not be condemned.

(6) *Curds*.—Curdy milk results from precipitation of curd because of faulty manufacture. The curd appears as flakes or lumps. There is no off odor or flavor. This milk is not injurious to health, but because of its similarity to sour curdled milk, it should be rejected upon receipt and should not be used if the condition is found after storage. Sour curdled milk is due to bacterial action resulting in acid curdling. It is inedible and should be rejected when offered for delivery and condemned when found in storage.

(7) *Fermentation*.—Fermented milk results from leaky cans or incomplete sterilization. It results in blown or swelled cans. It is inedible and should be rejected or condemned whenever found.

(8) *Storage*.—Evaporated milk in cans has excellent keeping qualities. Under fair storage conditions it will keep for a year without developing defects other than cream separation. However, it must be stored away from heating coils or radiators or immediately under galvanized iron roofs. As it is produced in great quantities throughout the year there is little need for long storage.

(9) *Standards*.—Federal standards have been established and all

manufacturers produce milk just meeting minimum requirements of the standards. Very seldom is any found that does not meet those standards. Determination of milk solids is a laboratory procedure and requires special equipment not available in the field. Dirt and other sediment may be determined by the sedimentation test, and acidity by titration. These also are laboratory tests and require laboratory equipment.

c. Sweetened condensed.—This product is inspected for consistency, flavor, color, and soundness.

(1) *Consistency.*—Because of its high sugar content, sweetened condensed milk is quite dense and viscous. The freshly made product is a very dense fluid and when poured from the can considerable quantities adhere to the tin. It should be smooth to the touch without any evidence of grittiness. Sandy or gritty milk results from crystallization of the milk sugar, resulting in very hard, rough sugar crystals which feel like grains of sand between the teeth or between the fingers. Sandy milk is not inedible and is not injurious to health, but that offered for delivery should be rejected. Settled milk results from settling of sugar (sucrose) upon long standing. Being heavier than the watery constituents of the milk, the sugar gradually settles to the bottom. It is somewhat difficult to reincorporate the sugar with the milk once it has settled out. Such milk can be used for cooking and baking purposes. Settled milk should be rejected if offered for delivery, but should not be condemned if found in storage. Sweetened condensed milk is not sterilized in the can as is evaporated, depending upon its sugar content for preservation. Because of its nonsterile condition, the chief defects arising in this product are lumpy and thickened (cheesy) milk. Lumps and buttons are produced by molds and bacteria resulting from use of poor milk and from insanitary equipment and methods of manufacture. Such milk should be rejected upon delivery. However, this defect is largely confined to the surface and when removed the milk may be used with safety. Thickened and cheesy milk results from age or use of insufficient sugar. It may become custard-like or have the consistency of soft cheese. It is not harmful but not desirable, and should be rejected.

(2) *Color.*—The color of freshly made sweetened condensed milk is creamy white. A brown color develops with age, particularly if its is not stored in a cool place. Old milk has a deep brown color. While browning is not harmful it is undesirable. Milk offered for delivery that shows browning should be rejected.

(3) *Flavor*.—Since condensed milk is not heat-processed, it does not have the cooked flavor characteristic of evaporated milk. Flavor should be clean and free from any foreign taint. In storage it may develop rancid or metallic flavors. The former is due to fat-splitting bacteria and the latter results from faulty manufacturing methods or equipment. Both are undesirable and their presence warrants rejection. Gaseous fermentation produces swelled cans. Such milk is inedible.

d. Dry powdered.—The laboratory procedure for examination of powdered milk is described in detail in Federal specifications. These tests depend entirely on laboratory equipment and technique, and are not adaptable to field inspection.

(1) *Color and texture*.—Inspectors should be familiar with the difference in color and texture of skimmed and whole milk powders and of spray-dried and film-dried powders. Skimmed milk powder is of a light creamy white color while whole milk powder has a distinct creamy or yellowish cast. Spray-dried powders have a very fine, fluffy, floury appearance and feel, and require no grinding in preparation for market. Film-dried powders come from the drums in broad, thin sheets that must be ground and bolted in preparation for market. Film-dried is granular in consistency.

(2) *Storage*.—Keeping qualities of powdered milk depend upon exclusion of air, light, and moisture. Because of its low fat content, skimmed milk powder is not readily oxidized, but whole milk rapidly deteriorates due to oxidation. Rancidity rapidly develops in whole milk powder exposed to air. When milk powder is exposed to air, it absorbs moisture and caking ensues. Moisture absorption also furthers bacterial action, and renders the powder less soluble. The only solution for these defects is hermetic sealing in vacuum or in inert gas. A vacuum can be maintained and use of inert gas (nitrogen) is possible only in hermetically sealed containers. Containers with friction plugs or cover are not hermetically sealed. In hermetically sealed containers either in vacuum or in inert gas, milk powders keep well for months. They should be stored away from heat. The best storage temperature is 35° to 45° F., but these powders stand up well at room temperature.

87. Butter.—*a. General*.—Butter inspection procedure is outlined in Subsistence Bulletin No. 14—Dairy Products. Butter grades and butter scoring factors are given in the above bulletin and in U. S. Standards of Quality of Creamery Butter. Tests for butterfat, salt, and moisture are simple laboratory procedure. Compliance with specification requirements for quality of cream, percentage of acidity

in cream, and pastuerization can be determined definitely only at the creamery before or at churning time, but grain and flavor reflect cream quality and handling methods. Grades are based on factors ascertained by physical examination. Flavor is ascertained by smelling and tasting; body, by feel and appearance; color, by visual examination and by use of a standard butter-color rod; salt, by taste; and style, by visual examination. For tub butter a long butter trier is essential; for smaller packages a cheese trier is better adapted. A plug is drawn by inserting the trier as nearly through the sample as possible, giving the trier a turn and withdrawing it. From the plug the inspector makes his determination of flavor, body, color, and salt, after which the plug is returned and the trier withdrawn. The chief grading factor is flavor. Only a very small percentage of market butter shows serious defects of body, color, or salt. The inspector should remember that most market butter falls within a very narrow score range. Very little market butter scores higher than 93, and that scoring less than 89 has such serious defects, particularly of flavor, as to be undesirable for table use. Butter scoring 90 possesses aroma, flavor, body, and color that make it satisfactory for table use as well as for cooking or baking. Butter scoring 92 or higher must have highly desirable qualities of aroma, creaminess, freshness, and palatability, and be almost perfect in body, texture, color, salt, and style. Butter of higher score only possesses higher aroma and flavor. It must be kept under refrigeration at all times. Good butter will keep well in an ordinary ice box for a month if protected from foreign odors. If it is to be kept for a longer period, it should be frozen and held at a temperature not higher than 0° F.

b. Rating.—The rating of the various factors used in scoring butter as given in United States Department of Agriculture Department Circular 236, is quoted below:

FIVE CLASSES OF DEFECTS IN QUALITY

In the inspection of butter its quality is considered from the standpoint of flavor, body, color, salt, and package. In determining the final score, each of these factors is rated separately, with the following number of points given to each: Flavor, 45; body, 25; color, 15; salt, 10; and package, 5; total, 100. The ratings given to each factor are governed by the absence or presence of certain defects. A careful reading of the following rules, used by the Federal Bureau of Agriculture Economics in the inspection of butter under the food products inspection law, will indicate the effect of defects on the rating given each factor and the final score of the butter:

THE RATING OF FLAVOR

The rating given to flavor shall be determined by the flavor characteristics as follows:

A. Desirable flavors, minimum rating of 37 points.

(a) Butter that is fresh, fine, sweet, mild and clean in flavor, and has a certain creaminess or richness that gives it a particularly pleasing taste and aroma, shall receive a rating of 40 to 45 points, inclusive.

(b) Butter that is fresh, fine, sweet and clean in flavor, if of fresh make, or fine, sweet, and clean, if storage, shall be given a rating of 38 to 39 points, inclusive.

(c) Butter that is fresh, sweet and clean in flavor, if of fresh make, or sweet and clean, if storage, shall be given a rating of not less than 37 points.

B. Objectionable flavors.

(a) Maximum rating of 36 points. Butter that is free from "foreign" or "off" flavors, but which shows any of the following taints or flavors, shall receive a rating of 36 points or less for flavor, according to the degree of defect, and shall receive a maximum of 36 points, provided the flavor is only slightly objectionable:

(1) Mechanical taints—flavors having their origin in the process of manufacture or in the conditions under which the butter is held after manufacture, but not indicating aged or stale cream: Burnt, oily, heated, mealy, frozen cream, greasy, lardy; also storage and fruity flavors in Held butter.

(2) Bacterial taints—flavors having their origin in bacterial development, but not indicating aged or stale cream: Cowy, barny, acidy, yeasty, summery, cheesy, curdy.

(3) Feed taints—flavors having their origin in feed conditions at the point of production, but not indicating aged or stale cream: Weedy, frosted feed.

(b) Maximum rating of 35 points. Butter showing the following objectionable flavors shall be given a rating of 35 points or less, according to the degree of defect: Metallic, wintry, bitter; also "old" flavor in Held butter.

(c) Maximum rating of 33 points. Butter showing the following objectionable flavors shall be given a rating of 33 points or less: Unclean, musty, distinct lime or alkaline flavors.

C. Foreign flavors.

(a) Maximum rating of 33 points. Butter showing a taint of gasoline and having no other objectionable flavor, shall be given a rating of 33 points or less.

(b) Maximum rating of 32 points. Butter showing garlic or wild onion flavor, shall be given a rating of 32 points or less.

D. Off flavors, maximum rating of 32 points. Butter that shows any of the following flavors, ordinarily termed "off" flavors, shall be given a rating of 32 points or less, depending upon the extent of the defect: Fishy, tallowy, unclean, stale cream, stale oily, stale metallic, stale sour, stale cheesy.

THE RATING OF BODY

Butter receiving the maximum rating of 25 points for body must have a firm, waxy texture and a perfect grain, as indicated by a jagged or irregular toothed edge, when the butter is broken apart. It must be free from salviness or excess free moisture, and must not show a milky brine.

THE RATING OF COLOR

Butter receiving the full rating of 15 points for color must be free from all foreign color specks, waviness, streaks or mottles, and must be uniform in color in all parts. The ratings given to the various degrees of uniform color shall be as follows:

A. Light color: Butter having a light straw color shall be given the full rating of 15 points.

B. Medium color: Butter having the color of the natural grass product, without the use of additional color, shall be given the full rating of 15 points.

C. High color: Butter having a color higher than that of natural grass butter shall be given a maximum rating of 14 points.

THE RATING OF SALT

Butter which is not excessively high in salt, and which shows no undissolved salt, and in which the salt is uniform, shall be given the maximum of 10 points for salt. The ratings given butter showing different amounts of salt properly dissolved, shall be as follows:

A. Unsalted butter shall be given the full rating of 10 points.

B. Light salted butter, that contains $1\frac{1}{2}\%$ or less of salt and has a very slight salty taste, shall be given the full rating of 10 points.

C. Medium salted butter, that contains over $1\frac{1}{2}\%$ and not above $3\frac{1}{2}\%$ of salt, and has a mild and yet distinct salty taste, shall be given the full rating of 10 points.

D. High salted butter, that contains over $3\frac{1}{2}\%$ of salt and has a sharp, briny or pronounced salty taste, shall be given a maximum rating of 9 points.

THE RATING OF PACKAGE

Butter receiving the full rating of 5 points for package must be neatly and properly packed in sound, uniform packages, which are clean and entirely free from mold.

88. Cheese.—Inspection and grading procedure, grades, grading factors, and definitions of terms used in grading American Cheddar cheese and Swiss cheese are given in Subsistence Bulletin No. 46—Cheese. The inspector should be familiar with terms used in cheese grading. Familiarity with the characteristics of texture and flavor resulting from aging is acquired only by experience. Other grading factors are not difficult of understanding and application. Cheese improves in flavor with age if kept at proper temperatures. It is never frozen but should be kept under refrigeration. At room temperature or in summer heat, it has limited keeping qualities. In an ordinary ice box and protected from drying, Cheddar and Swiss will ordinarily keep well for weeks. Cottage cheese is highly perishable and should not be stored longer than 36 hours.

SECTION XIII
POULTRY AND EGGS

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89. Poultry.—The classes of poultry purchaseable under Federal specifications are dressed chickens, fowl, ducks, geese, and turkeys. Inspection of poultry embraces determination of class, grade, and condition.

a. Chickens.—(1) *Classes.*—The classes of chickens are based on age, size, weight and sex. Broilers are young chickens of either sex weighing 2½ pounds or less, fryers 2½ to 3½ pounds, dressed. Roasting chickens are young cockerels weighing 3½ pounds and up, dressed. Fowl are mature female chickens weighing 3½ pounds and up, dressed. Stags are male chickens older than cockerels but not fully mature. Cocks are mature male chickens. Stags and cocks weigh 3½ pounds and up. Capons are male chickens that were caponized (castrated) when young. Age of dressed chickens is indicated by size, condition of flesh with regard to tenderness or toughness, flexibility or hardness of cartilages, smoothness or roughness of legs, and extent of spur development. Young chickens (broilers and fryers) are small; older chickens increase in size. In broilers, fryers, capons, and roasting chickens the flesh is tender and can be cut easily by pressure with the thumb nail. Flesh of fowl is less tender. Flesh of stags and cocks is dark in color and hard and resistant to pressure. The cartilage at the rear end of the keel of young chickens is soft and flexible; that of fowl, stags, and cocks is hard and inflexible. Legs and feet of young birds are smooth and shiny while those of old birds become roughened, being scaly and gnarly in very old birds, and lose their shiny appearance. Broilers have no perceptible spur development; fryers have perceptible but very small spurs; capons and roasting chickens have small spurs that are short, wide, rounded, and not horny; fowl have very narrow, short spurs; stags have pronounced straight but rounded spurs; and cocks have long, hard, curved, pointed spurs. Size and weight develop with age. There is little to differentiate sex in young chickens, but as the birds near maturity definite sex characteristics develop. Male chickens (cockerels, stags, and cocks) develop more luxuriant plumage, larger combs and wattles, larger heads, larger legs and wings, and greater spur development than do females (pullets and hens), and body development is uniform, re-

maining narrow and shallow in the rear. Female chickens are characterized by small heads, small combs and wattles, small wings and legs, rudimentary spur development, and the body becomes deep and wide especially in the rear.

(2) *Grades*.—Grades of dressed chickens are based on color, fatness, freedom from blemishes (torn skin, broken bones, crooked breasts, etc.), absence of pinfeathers, bruises, and engorged blood vessels. Color refers to color of skin, legs, and fat. Color is a breed characteristic and is also influenced by feed. Broilers and fryers are frequently produced from the egg breeds (leghorns, etc.), which have comparatively white skins. Roasting chickens and fowl are produced largely from the dual purpose breeds which have yellow legs and yellowish skins. Milk feeding produces white or creamy white fat while corn feeding produces fat of a yellow cast. Fatness depends upon the quantity and distribution of fat. Practically all broilers, fryers, and roasting chickens are milk-fed just before slaughter. Fattened fowl usually have considerable fat deposited in and around the abdominal cavity. While blemishes may not reduce food value of chickens, they detract from appearance. Imperfect bleeding is indicated by engorged blood vessels along neck and near thighs, and may appear on other parts of the body. Engorged blood vessels appear as reddish streaks in or underneath the skin. Torn skin is the result of careless handling during dressing. Bruises are a source of waste and further early deterioration. Crooked breasts are deformities and detract from appearance and also interfere with carving. Black pinfeathers detract from appearance of dressed chicken, particularly if the skin is white.

Fancy grade includes chickens with good color, tender flesh, meaty breasts, free from such defects as crooked breast bones, broken bones, torn skin, bruises, black pinfeathers, etc., and with evenly distributed fat of good color.

Choice chickens must have good color, tender flesh, and fairly meaty breasts but may have a small percentage of birds with small skin tears, an occasional broken wing or leg if the edible tissues are not injured thereby, and small superficial bruises. In commercial practice the crops of undrawn birds are emptied by cutting a hole through the skin and crop. These holes are not sewed up.

(3) *Dressing*.—Chickens are dressed by slack scalding or hot scalding. Dry picking is no longer commercially practiced. Slack scalded birds are immersed in water at a temperature not higher than 130° F. Practically all broilers, fryers, roasting chickens, and fatted fowl are slack scalded. Slack scalding leaves the skin soft, flexible,

and unshrunk, and not water-soaked. The feather follicles are closed and the skin is without tears and has a bright bloom. Slack scalded birds are air chilled in refrigerated rooms. Hot scalding consists in immersing birds in water at a temperature of about 180° F. Stewing hens, cocks, and birds prepared by local markets are largely hot scalded. Hot scalding shrinks the skin leaving it tightly drawn over the flesh, water-soaked, and it tears easily. Feather follicles are open and skin has lost its bloom. Scalded birds are usually chilled by immersing in cold water. Chickens may be undrawn or drawn. Undrawn birds have all internal organs intact and head and feet remain on. Under specifications all frozen chickens are undrawn, though freezing drawn chickens is increasing commercially. Under the specification "drawn" means full-drawn, that is, head, feet, and all viscera, including crop, gullet, lungs, windpipe, abdominal viscera, and oil sac should be removed. Gizzard, heart, and liver (free of gall bladder) are wrapped in nonabsorbent paper and returned to the abdominal cavity or delivered in separate package.

(4) *Production*.—Production of dressed poultry is seasonal. Broilers are produced largely from middle of June to early August, fryers from late July to October, and roasting chickens from October to late December. At other seasons only frozen chickens of these classes are available.

(5) *Storage*.—Frozen chickens keep well from one season to the next. Storage defects are freezer burn, shrinkage, and loss of bloom. Freezer burn is dehydration of the skin in small areas usually around feather follicles. It gives the skin a pockmarked appearance, though it detracts little or none from food value. It is largely prevented by proper wrapping and packaging. Shrinkage of chickens in cold storage is negligible. Chilled chickens, both drawn and undrawn, have limited keeping qualities. In undrawn birds contents of the digestive tract are apt to ferment unless temperatures close to freezing are maintained. The open visceral cavity of drawn birds offers a good surface for bacterial growth. Inspection of undrawn, chilled chickens should include observation for protruding and discolored vents, and sliminess and bad odors underneath wings and thighs. The visceral cavity of drawn, chilled chickens should be carefully inspected for sliminess and bad odors. Fresh (unchilled) chickens have very limited keeping qualities. They should be prepared for cooking as soon as possible after killing and drawing. Unchilled chickens should never be piled in deep layers. Aging does not improve tenderness and flavor of chickens.

b. Ducks and geese.—With the exception of green ducks which are produced to a limited extent near some large cities, marketing ducks and geese is seasonal. They are not found on the market except in cold weather, particularly near the holidays, and are sold fresh almost exclusively. Only those not consumed during the holidays are cold stored. No distinction is made in sex in ducks and geese, as no difference in conformation, quality, tenderness, or edibility exists. Age of dressed ducks and geese is determined by condition of the trachea (windpipe). In young birds the cartilages of the trachea are soft and yielding, while in old birds they are hard and resistant to pressure. Old birds have darker flesh than the young but this is usually difficult to determine in the dressed birds because of the fat covering. Dressed birds should be plump and breasts should be full and rounded. Protrusion of the breastbone above surrounding meat indicates poor condition. Federal specifications permit purchase of fancy grade only. Fancy ducks and geese have good color, bright bloom, are plump and meaty, well-covered with fat, and free from such defects as bruises, torn skin, broken bones, pinfeathers, etc. Yellow-skinned birds are more attractive than white-skinned.

c. Turkeys.—The classes of turkeys are young and old toms, young and old hens. Toms are male turkeys and hens are females. The distinctive differences between toms and hens are the same as between cockerels and hen chickens, and in addition the nose wattle (the fleshy wattle over the beak) is larger and longer on the male, and the beard (bunchy growth of hair on breast) is larger on a tom than on a hen. Under Federal specifications only young toms and young hens may be purchased. Age differentiation and grading factors for turkeys are identical with those for chickens. Fancy young turkeys must have an attractive bloom; be plump with well-rounded breasts; soft meat; well covered in and beneath the skin with white fat; be free from bruises, torn skin, broken bones, and pinfeathers; head wrapped in paper; feet clean, smooth, and a bright color; have little or no spurs; have soft, flexible cartilage at end of keel; and be in prime condition as evidenced by dry skin free from any sliminess or off-odor. Choice young turkeys must have the same characteristics as to age and condition, but may have slight bruises, slightly torn skin if not on the breast, and may not be so full meaty or so well covered with fat as turkeys of fancy grade. Turkeys have the same keeping qualities as chickens under the same conditions, and the same principles of storage and preparation apply. Frozen poultry is best defrosted in a refrigerator, the same principles applying as for frozen beef.

90. Eggs.—Inspection of eggs includes determination of net weight and quality or grade.

a. Net weight.—Bulk eggs are delivered in cases of 30 dozen each. Cases are made of wood divided into two compartments each having five sets of fillers holding 3 dozen eggs each. Egg cases vary slightly in weight with the kind of wood, dryness, etc., but average between 7 and 8 pounds per case. Several forms of fillers and flats are used. Fillers are usually of the "honeycomb" type and are made of hard calendered cardboard. Flats may be of flat, hard calendered cardboard or made of pulpwood and be in cup shape to retain eggs in a vertical position (mapes flat). Fillers and flats weigh from 4 to 5 pounds. The tare on eggs will vary from 11½ to 13 pounds per case. Federal specifications prescribe net weight per case required during various months for various grades. All cased eggs should be weighed upon receipt to determine net weight. An occasional test of weight of cases, fillers, and flats will establish tare.

b. Cases.—Cases need not be new, but they should be sound, clean, and free from stains and bad odors. Fillers and flats should be sound, clean, sweet, and free from any soiling. For Army deliveries new fillers and flats are prescribed.

c. Classes.—Three classes of eggs are specified by Federal specifications: fresh, storage or refrigerator, and processed (oil treated). Fresh eggs are those that have not been in cold storage, the term not necessarily meaning that they have been laid recently. They may be 30 days or more from laying time. They must show certain definite quality characteristics as revealed by candling. These characteristics are set forth in the publications referred to in *f* (2) below. Storage or refrigerator eggs are those which have been in cold storage and may be from 1 month to 9 months from laying time. Processed (oil treated) eggs are those treated by dipping momentarily in hot oil to seal pores of the shell, thereby retarding shrinkage and also destroying molds and bacteria, thus enhancing keeping qualities. Shells of processed eggs usually have an oily feel, and small spots of oil stain usually may be found on flats where the eggs have rested. Processed eggs may be either fresh or refrigerator, the latter being processed while fresh. For delivery under Federal specifications, refrigerator eggs should not be processed after being under refrigeration. Only strictly fresh eggs should be processed.

d. Infertile eggs.—Infertile eggs cannot be determined by candling. Fertile eggs that have been exposed to heat usually show some development of the "hatch spot" (germ), but infertile and strictly fresh eggs should show no such development. To secure in-

fertile eggs, it is necessary to obtain them from flocks known to keep hens separated from cocks and cockerels.

e. Washed and sandblasted eggs.—Washed eggs are undesirable in that they have limited keeping qualities because water penetrates pores of the shell carrying with it any bacteria or molds that may be on the shell or in the water. Eggs are washed only when too dirty to sell as is. Sandblasted eggs are undesirable chiefly because they indicate that the eggs were dirty. In sandblasting the bloom and outer layer of the shell is worn away by attrition from a flow of sand. Excessive sandblasting weakens the shell and makes it more fragile. Sandblasted eggs lose their protective outer covering and are less resistant to invasion by bacteria.

f. Grade.—(1) *Determination.*—Grades are based on quality and condition. Quality and grade in eggs are determined by candling. Loss in eggs is based on defects which lessen or destroy food value. All inedible eggs (rotten, broken (leaking), spots, broken yolk, frozen (split), hatched (blood veined), and sour eggs) are counted as full loss, while small, dirty, checked, badly stained and seconds are counted one-third loss. The grade of a lot of eggs is based largely upon loss established in candling one-half case from each of a representative number of cases taken at random from the lot. Under Federal specifications no loss from inedible eggs is allowed, but a tolerance is allowed in each grade for loss other than inedible eggs. In order to understand grading factors and tolerance terms, the inspector must be familiar with trade terms and definitions as outlined in the United States Standards and Grades for Eggs.

(2) *Equipment.*—Inspection personnel should provide themselves with the following:

United States Standards and Grades for Eggs, United States Department of Agriculture.

Subsistence Bulletin No. 16, Poultry and Eggs.

Air Cell Gage, United States Department of Agriculture, and egg candling device.

United States Standards and Grades for eggs defines terms used in candling as well as United States grades and factors upon which those grades are based. Subsistence Bulletin No. 26, Poultry and Eggs, describes candling procedure and gives commercial grades established by certain commercial exchanges. An air cell gage is desirable in determining degree of shrinkage. A candling device is essential. A portable candling device may be purchased or a satisfactory one may be made. The best light is electric, but a candle or other light may be used.

SECTION XIV

FISH

Paragraph

91

Fish-----

91. Fish.—Inspection of fresh fish is concerned with variety, style of dressing if any, and condition upon delivery.

a. Variety.—No restriction is made by Federal specifications as to variety. The varieties available vary with the section of country in which purchased. Inspectors should be familiar with varietal characteristics. No attempt will be made in this manual to describe the many varieties which may be purchased.

b. Dressing.—Commercially, fresh fish may be delivered round or gutted, heads on or off, gills in or out, scales on or off, skin on or off, split or unsplit, in sides, chunks, slices, and fillets. Trade custom prescribes form in which ordinarily marketed. Proposals for bids should state definitely the form desired.

c. Condition.—(1) *Stage.*—Condition refers to freshness or lack of it. Three stages of condition are recognized, fresh, stale, and putrid.

(a) *Fresh.*—Fresh fish are characterized by a bright appearance, glittering scales that adhere tightly, surface slime natural to the species that is free of decomposition odors, bright, shiny, outstanding eyes, bright red gills that are free of off-odors, closed mouth and gill covers, firm, elastic abdominal wall free from evidence of bloating, flesh that is firm and resilient, bright red blood in the abdominal wall particularly under the backbone, and a fresh odor characteristic of the species. When laid across the hand a fresh fish bends but little.

(b) *Stale.*—Staleness is indicative of deterioration and results from bacterial and enzymic action. It is characterized by a dull appearance, dullness and slight loosening of scales, change in natural slime to greater stickiness or dryness, somewhat sunken and less brilliant eyes, dull-colored gills, abdominal wall somewhat soft and flaccid and may be slightly distended, flesh that does not pit on pressure but is less resilient, blood turning a brownish color, and development of a slight off-odor. A stale fish laid across the hand is less rigid than a fresh.

(c) *Putrid.*—Putrid fish are characterized by a very dull appearance, lack of brilliance, loosening and falling off of scales, complete dryness or an extreme slipperiness of slime accompanied by a putrid odor, eyes sunken or entirely disintegrated, gills a dull brown color

and with a putrid odor, open mouth and gill covers, soft, spongy abdominal wall frequently with bloating and protrusion of the vent, flesh that has entirely lost its resiliency and in which pitting produced by pressure remains, blood of a dull brown color, and a general odor of decomposed flesh. When laid across the hand a putrid fish sags at all unsupported points.

(2) *Delivery*.—A putrid fish is unsafe for eating, and putrid fish and those showing advanced staleness should be rejected. While fish showing beginning staleness might be used without danger, safety requires that such be rejected. Only strictly fresh fish should be accepted. They should be delivered thoroughly chilled and iced, and any delivered without ice should be viewed with suspicion. Frozen fish should be delivered solidly frozen, and those delivered in a partially thawed condition also should be viewed with suspicion. They should be delivered in sufficient time to allow defrosting. Fresh fish should be delivered only in sufficient time to allow preparation before cooking.

SECTION XV

EXCERPTS FROM FEDERAL FOOD, DRUG, AND COSMETIC ACT

Excerpts from Federal Food, Drug, and Cosmetic Act..... Paragraph 92

92. Excerpts from Federal Food, Drug, and Cosmetic Act (act June 25, 1938 (52 Stat. 1040)).

SEC. 201 (f) The term "food" means (1) articles used for food or drink for man or other animals, (2) chewing gum, and (3) articles used for components of any such article.

(k) The term "label" means a display of written, printed, or graphic matter upon the immediate container of any article; and a requirement made by or under authority of this Act that any word, statement, or other information appear(ing) on the label shall not be considered to be complied with unless such word, statement, or other information also appears on the outside container or wrapper, if any there be, of the retail package of such article, or is easily legible through the outside container or wrapper.

SEC. 402. A food shall be deemed to be adulterated—

(a) (1) If it bears or contains any poisonous or deleterious substances which may render it injurious to health; but in case the substance is not an added substance such food shall not be considered

adulterated under this clause if the quantity of such substance in such food does not ordinarily render it injurious to health; or (2) if it bears or contains any added poisonous or added deleterious substance which is unsafe within the meaning of section 406; or (3) if it consists in whole or in part of any filthy, putrid, or decomposed substance, or if it is otherwise unfit for food; or (4) if it has been prepared, packed, or held under insanitary conditions whereby it may have become contaminated with filth, or whereby it may have been rendered injurious to health; or (5) if it is, in whole or in part, the product of a diseased animal or of an animal which has died otherwise than by slaughter; or (6) if its container is composed, in whole or in part, of any poisonous or deleterious substance which may render the contents injurious to health.

(b) (1) If any valuable constituent has been in whole or in part omitted or abstracted therefrom; or (2) if any substance has been substituted wholly or in part therefor; or (3) if damage or inferiority has been concealed in any manner; or (4) if any substance has been added thereto or mixed or packed therewith so as to increase its bulk or weight, or reduce its quality or strength, or make it appear better or of greater value than it is.

SEC. 403. A food shall be deemed to be misbranded—

(a) If its labeling is false or misleading in any particular.

(b) If it is offered for sale under the name of another food.

(c) If it is an imitation of another food, unless its label bears, in type of uniform size and prominence, the word "imitation" and, immediately thereafter, the name of the food imitated.

(d) If its container is so made, formed, or filled as to be misleading.

SEC. 406. (a) Any poisonous or deleterious substance added to any food, except where such substance is required in the production thereof or cannot be avoided by good manufacturing practice shall be deemed to be unsafe for purposes of clause (2) of section 402 (a);

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BY ORDER OF THE SECRETARY OF WAR:

G. C. MARSHALL,
Chief of Staff.

OFFICIAL:

E. S. ADAMS,
Major General,
The Adjutant General.



